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An Integrated Theory of Accounting Using Capital/Expense Decision in the Petroleum Industry as a Special Application.

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AN INTEGRATED THEORY OF ACCOUNTING USING CAPITAL/EXPENSE DECISION IN THE PETROLEUM INDUSTRY AS A SPECIAL APPLICATION

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Accounting

by
Abdulfattah Omar Dia Elmadfai
B.S., University of Libya, 1965
M.S., University of Wisconsin, 1970
August, 1976

In the name of God, Most Gracious, Most Merciful. Praise be to God, The Cherisher and Sustainer of the Worlds; Most Gracious, Most Merciful; Master of the Day of Judgment. Thee do we worship, And Thine aid we seek. Show us the straight way, The way of those on whom Thou hast bestowed Thy Grace, Those whose (portion) is not wrath, And who go not astray.

The Holy Qur'ān

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My heartfelt thanks and prayers go to the memory of the most beautiful people of my life; my parents. God may have mercy and bless their souls.

Finally my deep thanks to the mighty Allah (God) for his help and wisdom throughout my life.

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ABSTRACT

This dissertation has sought a normative approach to laying down a feasible basis for formulating an accounting theory that provides a neutral solution with respect to all conflicting interest groups in the accounting methodology. In order to be normative, this theory must be deduced from within the accounting environment itself. Consequently, the deductive reasoning of this dissertation has taken three major steps which are as follows:

(1) Business sciences are considered to include the best description of the environment within which the accounting function must operate. Thus, some relevant parts of these sciences were carefully investigated and integrated with the hope of reaching adequate generalizations about the environment of accounting. Various generalizations were made throughout Chapters I, II and III.

(2) Then these generalizations were used in Chapter IV to derive a set of basic integrated accounting concepts.

(3) In turn, these concepts were used in Chapters IV and V to formulate a normative operating objective for accounting as well as a set of related accounting propositions that are required to guide and evaluate contemporary accounting practices.

The propositions of this dissertation center around the underlying fact that both the evaluation of the firm as well as the

evaluation of accounting practices must be made respectively in terms of an appropriately defined operating objectives of the firm and of accounting. Accordingly, maximization of the value of the firm to its stockholders was chosen as the most adequate operating objective underlying the activities of a business enterprise. Theoretically, the value of the firm depends on its expected return and risk (variability of return) relative to those of other firms. Therefore, providing adequate information for the evaluation of the firm as a whole and as a group of separate activities in terms of its expected return and risk is the most important role that the accounting function should play in its environment. Consequently, this dissertation has elaborated further on this proposed role of accounting measurement as the most appropriate operating objective of accounting for private enterprise.

Accordingly, accounting practices under this integrated theory ought to be cause/effect (or effort/accomplishment) extrapolatory accounting. Accounting propositions of this study explicitly carry accounting measurement and communication of information further beyond the requirements of the traditional measurement of net income and other balance sheet items. The difference in emphasis between the conventional accounting measurement and this theoretical study is clearly due to the difference in what constitutes an appropriate operating objective of the firm and that of accounting. While there is no definite objective which has been said to be served by the conventional accounting practices, it seems that the accounting function has been emphasizing the traditional business finance's view

of the maximization of profit as the appropriate operating objective of the firm. In turn, measurement of the dollar magnitude of net income and EPS was traditionally emphasized in order to portray the firm's performance in relation to that objective of profit maximization. However, this integrated theory with its prior acceptance of the maximization of stockholders' wealth as the ultimate objective of the firm ought to consider such factors as the overall managerial intentions of earnings retention versus dividends payments, the effects of the changes in the assets' composition on the firm's business risk, and the effect of the changes in the financing mix on the firm's financial risk as being equally important with net income in portraying the firm's accomplishments towards its operating objective. That is for the purpose of valuation of the firm risk and expected return analyses are inseparable; they are two faces of the same coin. Accordingly, this dissertation has sought normative propositions to guide and evaluate accounting measurement of these valuation factors and others.

Chapter VI has investigated the contemporary accounting practices of the capital/expense decision in the petroleum industry. Then, Chapter VII used the preformulated accounting propositions to evaluate these capital/expense decisions as a special application of this study. Accordingly, it was concluded that the lease is the most appropriate cost center with which the pre-production costs of an oil producer should be identified and accumulated. On the other hand, disposition of the capitalized costs (investment accounts) pertaining to each

lease should await the final outcome of the exploration and development activities on that particular lease.

Chapter VIII presents a summary of the findings and conclusions of this dissertation.

CHAPTER I

ENVIRONMENT OF ACCOUNTING - INTRODUCTION AND ORIENTATION OF THE PROBLEM

Purpose of the Dissertation and the Need for Accounting Reform

This dissertation is an attempt to construct an integrated theory of accounting using the evaluation of the contemporary contradictory accounting practices of capital/expense decision in the petroleum industry as a special case of the application of this theory. Hopefully, in addition to developing new capital/expense decision practices acceptable to all conflicting interest groups in the petroleum industry, this study can be extended to develop a more comprehensive theory applicable to the accounting practices of all business enterprises.

A brief look at the petroleum industry indicates that although it was not developed until the twentieth century, it became in a relatively short period of time one of the world's largest businesses and its products, have become fundamental to many other industries. These characteristics have made the petroleum industry subject to many economic regulations and political considerations. Accordingly, a unified accounting approach that would be reflective of the activities of this industry has become a critical need not only to the

investors and the management of oil companies, but also to the exporting and importing oil countries.

Traditional accounting theory includes several principles and postulates that can be used to develop a number of possible alternative approaches to a solution of the numerous accounting problems involved. However due to both the broadness of the terms in which these possible alternatives are expressed and the different conditions and degrees of risk under which oil and gas producers are operating, it is difficult to gather all these practices under one approach. Some writers argue that the practical approach of Accounting Principles Board (APB) is responsible for the failure of the accounting profession to formulate an appropriate set of accounting principles acceptable to all business enterprises. According to these critics, accounting principles were developed by the APB to suit management and accountants of various firms to the point that these principles resulted in multiple and sometimes contradictory accounting practices. For example, Chambers has pointed out that:

> "The freedom of company officers to choose accounting rules has, particularly over the recent past, been tolerated on the ground that accounting methods are matters of company policy. There have been increasing numbers of references to the accounting policies of particular firms."[1]

Also, in criticizing the APB, Chambers heavily emphasized the need for a normative approach to building an accounting theory. He indicated that:

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[1]Raymond J. Chambers, "Accounting Principles or Accounting Policies?" Journal of Accounting (May, 1973), p. 48.

> "The difficulties to which attention has been directed, are difficulties said by accountants to exist. I don't deny that the difficulties experienced or feared by accountants deserve no attention, but the difficulties of the users of the information produced are far more significant in terms of professional performance or competence."[2]

Furthermore, Sterling arrived at conclusions similar to those of Chambers, but Sterling based his conclusions on different reasoning. He attacks the current educational approach of accounting on the grounds that it ignores research and is based merely on the collection of contradictory accounting practices. In advocating a normative approach to the building of accounting theory, Sterling presented the following arguments.[3] 1) Research is isolated from education-practice. 2) Education and practice are complementary in that educators teach accepted practices and practioners practice what they are taught. 3) Accepted practices are inconsistent and therefore, the "theory" of accepted practice tends to identify "theoretically correct" with "accepted in practice." 4) Students taught a contradictory theory tend to resist attempts to reform practices by APB. 5) Management tends to resist accounting reform that threatens to inhibit their own flexibility. 6) The resistence of manngement and former students (practioners) has been a major cause of our inability to reform practice. Finally, Sterling suggested that:

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[2]Ibid,, p. 49.

[3]Robert R. Sterling, Accounting Research, Education, and Practice." Journal of Accounting (September, 1973), p. 52.

> "educators teach research results as the desired state and teach accepted practices as the current state. Adoption of this suggestion ought to lessen the resistence to reform within the profession and lessen the tendency to reason by contradiction."[4]

Accordingly, the approach to the derivation of an integrated theory in this dissertation is a normative one. It is based on deductive reasoning from within the environment of accounting. This approach is an eclectic one for, in addition to considering the internal environment of accounting as it applies to the capital/expense decision, this study will survey the research available in the fields of investment theory, portfolio analysis, financial management and the theory of the firm. The purpose of this investigation is to obtain an integrated set of generalizations relevant to the construction of propositions which in turn will serve as a framework to guide and evaluate the said accounting practices. These fields of study deal, in one way or another, with investment/consumption decisions of investors, allocation of economic resources and creation of wealth. Hence, such a survey is very promising and appealing because the research in these fields of business administration include a great deal of discussion and description of the environment in which accounting is, and should be, functioning.

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[4] Ibid., p. 52.

The Environment of Accounting and its Recent Development-Orientation

Throughout time theories of social sciences have been developed in order to describe and facilitate an understanding of the environment of human behavior. Accounting, however, does not seem to have reached a compatable normative position with regard to the developments and findings of these fields, especially the business sciences. One of the major reasons for the incompatability of accounting with its environment is found in Ijiri's suggestion which reflects the attitude of those who fear a normative response to building accounting theory:

> "The response should come after a careful study of the foundation upon which accounting has been constructed. The most dangerous trap that accountants could fall into is to be confused and demoralized by the numerous challenges from the neighboring areas of accounting in business and economics and to adjust their theories and practices here and there with a humble apology to these neighbors. Accounting has its own way of thinking about observing and organizing business phenomena. What is more important accounting has its own discipline and own philosophy which have been developed over many centuries. This does not mean that they should not be changed. It emphasizes that the response to the challenges should be made keeping always in mind the effects of this response upon accounting foundations. Otherwise, accounting will soon become simply a patchy collection of practices."[5]

Sterling, however, removes Ijiri's fears by explicitly stating that accounting is already a patchy collection of practices.

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[5]Yuji Ijiri, The Foundations of Accounting Measurement, A Mathematical, Economic and Behavioral Inquiry, (Prentice-Hall, Inc., Englewood Cliffs, N.J., 1967), p. IX.

> "Since changes do, in fact, occur, we know that there are exogenuous inputs to the circle. The source of these inputs is practice, not education or research. That is, practioners add to (they rarely substract from) their store of accepted practices and then educators observe codify and teach these additional accepted practices."[6]

A close look at the theories of other business sciences indicates that they tend toward a normative integration that emphasizes solving the problems of the real world.* They are more concerned with prediction of the future and the resolution of the uncertainty facing the decision maker. Meanwhile, accounting processes still concentrate on the measurement of historical events. In this regard Chambers has pointed out that:

> "The APB has never specified the particular acts or delibrations on which accounting information may be expected to shed light. I have not seen it argued that this or that rule of the alternatives available, will result in a better indicator of solvency, a better indicator of leverage, or a better indicator of rate of return or a better indicator of all three."[7]

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[6] Robert R. Sterling, p. 46.

*As this dissertation develops, it will show, particularly in Chapters 2 and 3, that investment analysis, portfolio analysis and financial management depend heavily on mean/variance analysis under conditions of uncertainty which largely characterize the business environment. Also, marketing decisions theory, microeconomic theory and econometrics emphasize the formulation of cost and revenue functions for studying and predicting the effects of economic conditions on the performance of the firm in the future.

[7] Raymond J. Chambers, p. 51.

The major developments in the business sciences, which are expected to have great impact on the integration of accounting measurement, are:

(1) The appearance of the theory of financial management which emphasizes the valuation of the firm in relation to its decisions of investment, financing, dividends, and working capital,

(2) the appearance of the theories of investment and portfolio analysis which emphasize security analysis and the individual's investment/consumption decision,

(3) the integration of the theory of financial management and security analysis, with the center of this integration being the valuation of the firm's operations in relation to its stockholder's wealth.

(4) While the integration of security analysis and financial management is taking place there is strong likelihood of the integration of capital market analysis into these two areas.

These four developments are the cornerstone to building the environmental model upon which the said integrated theory is to be constructed. Accordingly, it may be worthwhile for the reader to understand how these developments took place in relation to the static or, rather revolving situation of the contemporary accounting theory. The theory of financial management can be looked at as an extension of the theory of the firm (microeconomics), capital theory, corporate finance, and the field of financial institutions. Compared with its sources, the theory of financial management tends

to deviate from pure abstraction into the investigation of real economic problems in order to formulate practical rules for optimal investment, financing, dividends, and working capital decisions. That is, financial management tends toward a more explicit treatment of problems found in the real world. Solomon has indicated that:

> "The theory of financial management can be viewed as an extension of the theory of the firm. But whereas the traditional emphasis in micro-economics is on the relationship between profits and the volume of output, with the amount of capital input taken as fixed, the theory of financial management is expressly concerned with the relationship between profitability and the volume of capital used. Financial management is also an extension of prior work in capital theory. However, the bulk of traditional work in this field abstracts from the problem of uncertainty and by-passes the problem by the existence of different types of capital funds. In contrast, the theory of financial management is specifically interested in the phenomenon of many types of capital funds and in the interaction between the mix of financing and the evaluation of uncertain investment."[8]

Financial management is also an extension of the traditional approach to corporate finance, which emerged early in the twentieth century as a separate branch of economic and continued to dominate the financial function until the early 1950's. Accordingly, the financial function had emphasized liquidity and procurement of

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[8]Ezra Solomon, The Theory of Financial Management, (New York: Columbia University Press, 1963), p. 12.

funds and little attention had been given to managing the firm internally. Van Horne described this situation from the point of view of an outsider such as a lender-analyzing the firm and did not emphasize decision-making within the firm.[9] The accounting function with its prior emphasis on measurement of balance sheet items is essentially responding to the view of an outsider looking in. The rapid economic growth since the middle of 1950's, and the increasing changes in technology and competitive pressures, has resulted in an increasing need for the development of capital budgeting and related instruments of measuring and projecting economic data. These conditions have led some writers to suggest that at least part of the finance function should be from the insider looking out, rather than from the outsider looking in.[10] Accordingly, the optimal procurement, use, and allocation of capital funds to various activities of the firm has become an eminent and most important part of the finance function. In turn, maximization of the value of the firm to its stockholders has emerged as the proper criterion for evaluating the optimality of these new functions of finance. Valuation models, particularly models of mean (to measure expected return)/variance (to

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[9] James C. Van Horne, Financial Management and Policy, (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1971), Second Edition, P.S.

[10] F. J. Calkins, Pearson Hunt, Chelcie C. Bosland, and R. Miller Upton, "Materials and Methods of Teaching Business Finance," The Journal of Finance, V (September, 1950), pp. 270-92; Dauten, et al., "Toward a Theory of Business Finance," The Journal of Finance," X, 107-43; See also Pearson Hunt's review of the 1971 edition of Arthur S. Dewing's book, "The Financial Policy of Corporations," Quarterly Journal of Economics, LVIII, 303-13.

measure risk) analysis, have been developed to serve this purpose. Because the investors perception of the firm's risk/return characteristics affects the value of the firm's stock in the security market, knowledge of such perception has been incorporated into these valuation models. Investors' reactions to the firm's performance has become a major concern to those who make the firm's financial decisions. In this regard Van Horne has pointed out that

> "Security analysis and financial management are closely related and we are seeing an integration of these two previously separate areas of study. With this concern for valuation came a critical evaluation of the capital structure and the dividends policy of the firm in relation to its valuation as a whole. As a result of the widespread interest in capital budgeting considerable studies have been made toward an integrated theory of finance. In the future, valuation will be an even more important concept in the direction of the firm. Not only will security analysis and financial management become more enterwined, but there is likely to be an integration of capital markets analysis into these two areas."[11]

These developments in business sciences indicate that accounting has not been dynamic enough to keep up with the changes in its environment. The widely debated, but still unrealized objective, of compulsory price level accounting seems to be only one example of the many major contemporary accounting shortcomings. The introduction of risk/return analysis into business decision models, the widely accepted notion of efficient capital market and the related concept of

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[11] James C. Van Horne, pp. 5-6.

random-walking stock prices have degraded much published accounting information and continue to uncover other lacking economic data that could have been made available by the accountants. Accounting measurement seems to have been linked to the needs of the traditional business finance which views the expected return (the mean) as the only valid statistical decision parameter. Recent emphasis on the calculation of EPS to predict the firm's expected return seems to have made the accountants forget to think of the firm's risk complexion or variability of return as another decision parameter of equal importance. In summary, accounting measurement has been lacking in its correlation with the generally accepted findings in its environment.* Accordingly, this dissertation concludes that:

> generalization #1: A normative solution to the problems of contemporary accounting practices is required. Serving the business and economic environment of the society should be the underlying objective of such a solution. Therefore, any proposed solution should be derived from within the accounting environment itself.

The Need for Accounting Neutrality vs. Contemporary Accounting Standards:

Generally there are three groups of people interested in accounting methodology: (1) The management, which is concerned in

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*Discussion of various approaches of financial analysis, and in particular, valuation of the firm in Chapter 3 should make this statement clearer to the reader.

financial terms with increasing the value of the firm and is classified as an internal user of accounting information. (2) Stockholders, creditors, governmental agencies, etc. who are classified as external users of accounting information. In making its decisions, this group is interested in knowing about expected changes in the value of the firm. (3) The accountants who, as a professional group, are classified as information producers. Previous discussion indicates that these three groups seem to have diverse and opposing interests in accounting measurement. Formulation of an appropriate set of accounting principles that satisfies the desire of these interest groups is a formidable task. Accordingly, this dissertation concludes that:

> generalization #2: The possibility of existing opposing interests in the accounting methodology requires that the attitude of the accounting profession, as well as its instruments of measurement, remain neutral with respect to various information users.

This environmental generalization of accounting neutrality, then explicitly requires that:

> (a) The accounting profession take a neutral attitude in relation to information users, particularly when the information needs of both users are mutually exclusive. However, as shall be seen in Chapter IV, as far as the valuation of the firm and its operation is concerned,

the information needed by both users are highly compatable. Mutually exclusive information is more likely to appear because of the pressure imposed by management to show some desired, yet unrealistic, accounting figures - i.e. growth versus conservative net income. With respect to managerial manipulation of accounting measurement in the petroleum industry, Smith and Brock have stated that:

> "Some producers, chiefly those controlling closely-held companies and individually owned firms, have allowed conservatism to dominate their accounting policy, often to the point of flagrantly violating sound principles, in order to be assured that properties will not be overstated in the accounts."[12]

The fact that the presentation of financial statements is the responsibility of the management should not be interpreted as meaning that the choice of accounting principles and practices is also a management decision. There should be a separation between the responsibility of the management to submit reports of its performance and the right to choose accounting practices. The choice of an appropriate accounting practice is a professional matter to be left to the controller or some professional committee. It may be better that the controller or an independent committee be appointed by the stockholders for that purpose.

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[12] C. Aubrey Smith and Horace R. Brock, Accounting for Oil and Gas Producers, (Prentice-Hall, Inc., 1959), p. 77.

(b) There should be available a neutral set of concepts and related principles to guide accounting practices and lessen the accountant's subjectivity (which is likely to damage the accounting neutrality even if accountants maintain a neutral attitude in relation to information users). These principles must be formulated so that the resulting accounting information is processed and communicated in the manner that best describes the economic activities of the firm. The term "best describes" is at the heart of the problem that this dissertation will try to delineate. Therefore, this dissertation concludes its first concept of neutral accounting:

> "neutrality of accounting measurement should be derived from the state of impartially relating the formulation and the application of accounting principles (propositions) to the most feasible economic description of the activities of the firm, as well as to those intended feasible uses of such description.

Accordingly, the concept of neutrality must encompass the conventional standards of relevance, verifiability, and freedom from bias.* Erroneous and excessive information that has no relevance is

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*Committee to Prepare A Statement of Basic Accounting Theory. A Statement of Basic Accounting Theory. (American Accounting Association, 1966), pp. 7-13.

likely to be worse than having no information at all. The essence of neutrality is to produce useful information. Verifiability attests to the neutrality of the information. Thus verifiability enhances neutrality and attests to the validity of the information, as well as increases the confidences in using it. Biased information may result in personal gains to some users at the expense of others. The essence of neutrality is to avoid such an outcome.

Moreover, the concept of conservative accounting is rejected as inconsistent with neutral reporting. Managements have used this concept, particularly in the petroleum industry, to justify improper changes in the balances of some accounts. These changes are not the result of the economic actions of the firm and therefore, should not effect the evaluation of the firm by outsiders. One may defend conservatism as a traditional accounting approach to take risk matters into consideration. This approach suffers however, from the lack of specific rules to identify and measure risk. For example, some accounting balances which involve risk are to a large extent subjectively determined and reported without reference to the magnitude and nature of that risk. Accordingly, risk/conservative accounting decisions can be improperly used to dominate risk/conservative decisions of outside information users. It can also result in appropriate decisions of outside information users. It can also result in inappropriate decisions which would not have been made if risk factors had been adequately reported. What may be considered as a risky matter by one decision-maker may not be considered so by

others. Therefore, neutral accounting would require that traditional conservative accounting applications be replaced by a more explicit reporting on a firm's risk factors.

On the other hand, the going-concern concept is acceptable to this thesis because 1) it does not seem to contradict with neutral reporting and 2) valuation models, which are the cornerstone to the theory to be developed in this dissertation, assume that the firm is expected to continue its operations in the future.

The previous discussion has outlined the overall methodology of this dissertation to the development of an integrated theory of accounting. Accordingly, it was stated that such methodology should be a normative and neutral one. When compared with the conventional practical approach of formulating accounting principles, the approach of this dissertation can be considered as being extreme. Strict adherence to the said normativity and neutrality of this methodology may also be expected to result in a proposed solution, the application of which would require sudden changes and adjustments of accounting practices. Therefore, this dissertation concludes that:

> generalization #3: Managements and regulatory authorities, such as the SEC and the IRS, are likely to resist any sudden proposed change in accounting practices. Also, some inadequacies, if any, within the accounting profession - e.g., lack of competance and an increase in accountants'

responsibility - are likely to be obstacles in applying new solutions. Therefore, any theorization on a normative solution to the problems of accounting should preserve some degree of practicality in application.

The Plan of Study

The remaining part of this chapter explains some characteristics peculiar to the operations of the petroleum industry and outlines some accounting terminology currently in use by oil and gas producers. Chapter II is the first part on building an environmental model of accounting. Accordingly, this chapter will discuss and interrelate various concepts and models of making consumption/investment decisions by investors, i.e. portfolio decision analysis, diversification, fundamental security analysis, naive investment strategies, and beating the market in relation to its various degrees of efficiency. Chapter III is an extension of the discussion of the environmental model of accounting. Accordingly, major financial decisions of the firm (namely, investment, financing, and dividends) are discussed in relation to their combined effect on the valuation of the firm in the security market. This chapter will also discuss the basic model of integrating finance function, security analysis, and capital market attributes. Generalizations about the environment of accounting will be formulated whenever it is appropriate throughout chapters I, II, and III. These generalizations are used in Chapter IV to derive a basic set of accounting concepts and to propose an appropriate operating objective of accounting. Then, Chapter V uses these concepts to formulate a basic set of accounting propositions

which will serve as a framework to guide and evaluate the accounting measurement of assets, income and risk. Chapter VI is to investigate the contemporary accounting practices of the capital/expense decisions in the petroleum industry. Then, Chapter VII will use the formulated accounting propositions to evaluate these capital/expense decisions as a special application of this study. Finally, Chapter VIII will present a summary of the findings and conclusions of this dissertation.

Characteristics of the Petroleum Industry

The Production Process

The activities of the petroleum industry are traditionally divided into five stages: (1) prospecting, (2) acquisition, (3) exploration, (4) drilling and development, and (5) extraction or production. "Prospecting" is normally used to refer to those preliminary exploratory activities that lead to lease acquisition. These exploration operations start generating general ideas concerning the possibility of finding petroleum in a particular area. Once the idea is determined to be relatively good one, it is developed into a lease and becomes a "prospect." D.M.E. McLarty concludes that

> ". . . exploration starts by generating ideas which it develops and converts into prospects by the act of leasing. Next, it processes and evaluates these prospects to find drillable prospects. Then, it drills the prospects to find oil-bearing prospects

> which it develops to 'produce' the finished product - the fully developed oil property."[13]

Once a lease is acquired, further exploration involving discovery of crude-oil by geological and geophysical prospecting methods is needed. When petroleum reserves are found, additional wells must be drilled in specific patterns. In addition, producing facilities must be established to gather oil products and make them available for shipping. The final stage of the extracting process involves continuous costs, such as pumping, maintenance, area supervision and administrative overhead costs.

The petroleum industry, by its very nature, has other special characteristics. These are:

Controlling agreements

The industry is almost exclusively controlled by contractual obligations throughout its operations. The most important agreements result from lease acquisition, exploration, drilling and development activities. Most of these agreements involve the following:[14]

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[13]International Oil and Gas Education Center, Economics of Petroleum Exploration, Development and Property Evaluation, (Prentice-Hall, Inc., 1961), p. 82.

[14]For a more detailed discussion of these agreements see Smith and Brock, Chapters 8, 9 and 10; Field, Robert E., Financial Reporting in the Extractive Industry, Accounting Research Study #11, New York: American Institute of Certified Public Accountants, Inc., 1969, pp. 177-180; Irving, Robert H., and Draper, Verden R., Accounting Practices in the Petroleum Industry, (New York: Ronald Press Co., 1959), pp. 213-247.

(1) Mineral fees and mineral rights: Mineral fees represent costs incurred to purchase land. Thus the oil producer has the full ownership of both land-surface and under-surface oil reserves, if any. On the other hand, mineral rights refers to the situation where the oil producer acquires only the oil reserves if any.

(2) Cost of shooting rights: represent costs incurred to secure the right only to perform some preliminary exploration activities in order to determine the feasibility of acquiring the right to oil reserves (if any) by leasing or buying the land. These are usually immaterial costs compared with option costs.

(3) Option costs: option costs differ from the costs of shooting rights only in that, after the preliminary exploration, if the oil producer has developed a favorable idea about the lease he can exercise the option to acquire the lease subject to the agreement.

(4) Costs and deductions specified by the lease contract: Once the oil-producer has decided to acquire the lease on the property from the landowner, the two parties may agree on the following costs to be incurred:

   (a) lease bonus to be paid immediately as a consideration for signing the lease contract on the part of the landowner.

   (b) delay rentals to be paid as a consideration for the privilege of postponing drilling operations beyond the first year.

(c) Royalty payment - usually one-eighth of oil and gas produced - is retained by the landowner and is usually delivered to him free of all costs into the pipeline or he may receive it in terms of cash proceeds.

(5) Drilling cash or acreage contributions costs: represents cost incurred in the exploration stage. Accordingly, the landowners or the leasee of the adjoining property agree to contribute cash or acreage to the oil producer who wants to drill test wells in the nearby areas. The contribution is made not to achieve direct financial interest but to obtain geological information which may save both time and money. However, the agreement may provide for the contribution to be made regardless of the final outcome of the well drilled - "bottom-hole contribution." On the other hand, the agreement may provide that the contribution will be made only if the well is found dry - "dry-hole contribution."

(6) Overriding royalty: when the contributor gives acreage instead of cash and retains interest in the future production (if any), the interest retained is called "overriding royalty." To illustrate, when an oil producer assigns his interest, called "working interest" in a particular lease to another producer - who will develop the property or operate production activity - and retains some interest in the property assigned, the interest retained is "overriding royalty." Therefore, the contributee and the assignee in these two examples are obligated to give "royalty interest" to the landowner and overriding royalty to

the contributor and the assigner respectively. The remainder is considered their "working interest."

Large capital investment

Oil producers must spend a large amount of money to discover profitable quantities of crude oil. These reserves are their major assets and are subject to depletion by production "extraction." To stay in business, requires continuous efforts to discover and develop new reserves to replace the older, diminishing ones.

Producing properties are usually classified as fixed assets. Although oil reserves and other fixed assets (i.e., plant and equipment) are similar in that their values are subject to reduction by the process of production, they are different for:

(1) The quantity of oil extracted is directly considered as finished goods, while depreciation of plant and equipment is indirectly embodied in finished goods through the process of production.

(2) Duration of time has a great effect on the policy of allocating costs of plant and equipment to revenues, while time has little to do with the value of oil reserves. Paton and Paton describe wasting natural resources assets as ". . .essentially a store of raw materials generally under conditions where there is no deterioration or other physical loss with the passage of time."[15]

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[15] W. A. Paton and W. A. Paton, Jr., Asset Accounting, (New York: The Macmillan Co., 1952), p. 443.

(3) Oil and gas are located beneath the surface. Therefore, their measurement is subject to less accuracy than in the case of plant and equipment. Accordingly, depletion expense may increase or decrease between two years depending on changes in data or in the measurement instruments. Paton and Littleton state:

> The basic problem in determination of periodic depletion is estimating the commercial content of the particular deposit. In some types of extractive enterprises this estimate may be made with a high degree of accuracy; at the other extreme are cases in which the estimate is little more than a guess.[16]

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[16] W. A. Paton and A. C. Littleton, An Introduction to Corporate Accounting Standards, (American Accounting Association, 1967), p. 91.

CHAPTER II

ENVIRONMENT OF ACCOUNTING - ECONOMIC DECISIONS OF EXTERNAL INFORMATION USERS

The Utility Function of Economic Decision Makers

Decision-making within the business environment deals largely with conditions of uncertainty. Therefore, analysis of the utility function of information users is required to understand their reactions and various approaches to decision-making under these conditions. A basic assumption in economic analysis is that the ultimate objective of human actions is to maximize utility (U).[1] Utility is derived from the consumption of tangible as well as intangible objects, i.e., housing, food, pleasure, etc. Given that these consumable objects (X_i) have prices (P_i), then maximization of wealth (W) maximizes consumption which in turn maximizes utility.

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[1] Richard A. Bilas, Microeconomic Theory, (McGraw-Hill Book Company, 1971) Second Edition, Chapters 3, 4, and 5, pp. 37-112.

That is:[2]

$$U = f(W) \qquad \ldots\ldots\ldots\ldots (2.1)$$

and

$$\sum_{i=1}^{n} P_i X_i = f(W) \qquad \ldots\ldots\ldots\ldots (2.2)$$

where n is the number of consumable goods. Therefore, an individual having an amount of wealth W_1 (i.e., current value of his resources) is faced periodically with the decision of dividing his wealth between current periodic consumption C_1 and a portfolio investment I_1 so that $W_1 = I_1 + C_1$. The individual invests I_1 of his wealth because it will increase in value and this in turn will increase his future resources and utility. The increase in I's value is his rate of return r_t which is the rate of change in W. That is

$$r_t = (W_t - W_1)/W_1 \qquad \ldots\ldots\ldots\ldots (2.3)$$

where t is the end of the investment period. Accordingly, assuming

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[2]Such utility models have been used by many writers on this subject. Fur further detailed discussion of these and other similar utility models see Jack Clark Francis, Investment: Analysis and Management (McGraw-Hill Book Company, 1972), Chapter 13; J. Fred Weston and Eugene F. Brigham, Essentials of Managerial Finance (Holt, Rinehart and Winston, Inc., 1971) Appendix B to Chapter 9; H. Markowitz, Portfolio Selection (New York: Wiley, 1959), Chapters 6, 10, 13; S. Archer and C. D'Ambrosio, The Theory of Business Finance: A Book of Readings (New York: Macmillan, 1967), readings 2, 3, 4, 39 and 40; Milton Friedman and Leonard J. Savage, "The Utility Analysis of Choices Involving Risk", The Journal of Political Economy (August 1948), Vol. LVI, No. 4, pp. 279-304; Latane, J. H., "Criteria for Choice Among Risky Ventures," The Journal of Political Economy (April 1959), Vol. LXVII, No. 2, pp. 144-155.

certainty conditions exist, the utility function can be expressed in terms of rate of return. That is

$$U = f(r_t) \qquad \ldots\ldots\ldots\ldots (2.4)$$

The individual confronting the above consumption/investment decision must face one of the three situations: (1) certainty, (2) risk, or (3) uncertainty. In the uncertainty case, the individual is said to be facing the "most unpleasant of the three situations."[3] because he has knowledge of the possible outcomes (i.e., rates of return) associated with a given controllable variable but he does not know the probability distribution of these outcomes. Therefore, he must strive for lessening his problem, at least to the risk case, by obtaining the probability distribution of possible outcomes. With the probability distribution on hand, the individual can summarize his investment opportunities in a finite number of statistical parameters - the mean (μ) to measure expected return $E(r)$, and the variance or standard deviation, σ, to measure the degree of risk. Therefore, equation 2.4 must be modified to include the risk factor. That is,

$$U = f[E(r), \sigma]$$

Moreover, the introduction of the assumption that the individual is risk-averse will reduce the problem to the analysis of efficient portfolios. A risk-averse is said to have $\partial u/\partial E(r) > 0$ and $\partial u/\partial \sigma < 0$.

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[3] William Beranek, Analysis for Financial Decisions, (Richard D. Irwin Inc., Homewood, Illinois, 1968) Fourth printing, p. 25.

Namely, expected utility is an increasing function of E(r) and, it is a decreasing function of risk (σ).

Investment Decisions - A Portfolio Analysis Approach:

Study of various approaches to make investment decisions is required to know whether and how they should affect the accounting measurement and communication of information. Accordingly, this section is concerned with the portfolio approach of formulating investment decisions. This approach, which centers around mean/variance analysis, has been used by sophisticated financial analysts in studying the feasibility of investing in particular securities as well as being extended to the evaluation of new investment projects in relation to capital budgeting policies. However, all financial analysis by various writers along this approach are outgrowths of the early work by Harry Markowitz or what was referred to by him as "expected return-variance of return" rule (E.V.).[4]

Under this analytical approach the number of portfolios that should be considered is substantially reduced.[5] Attention should be restricted to portfolios which are efficient (not dominated by others) in terms of E(r) and σ. A portfolio selection requires a simultaneous and interdependent sub-decision concerning the allocation of

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[4]Harry Markowitz, "Portfolio Selection," Journal of Finance, Vol. 7, No. 1 (March 1952), pp. 77-91.

[5]Harry Markowitz, Portfolio Selection: Efficient Diversification of Investments, (New York: John Wiley & Sons, Inc., 1959).

investment I among various assets such as common stock, bonds, real estate, etc. Expected return and risk of individual assets are the determinants of the expected return and risk of the related portfolio.[6] The expected return $E(r_i)$ from the ith asset can be defined as

$$E(r_i) = \sum_{t=1}^{n} P_t r_t \qquad \ldots\ldots\ldots\ldots (2.5)$$

where p is probability of the t th rate of return, so that $\sum_{t=1}^{n} P_t = 1$, n being the number of various possible rates of return, and r_t the t th rate of return. Accordingly, risk is defined as the variability or the dispersion of the rate of return around its expected value:

$$\sigma^2(r_i) = \sum_{t=1}^{n} P_{it}[r_{it} - E(r_i)]^2 \qquad \ldots\ldots\ldots\ldots (2.6)$$

Therefore, the expected return of the portfolio $E(R_p)$ is the weighted average of the expected rates of return of the assets in the portfolio.

$$E(R_p) = \sum_{i=1}^{n} W_i \cdot E(r_i) \qquad \ldots\ldots\ldots\ldots (2.7)$$

where W_i is the proportion of funds invested in asset i. The risk of the portfolio is

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} W_i W_j \rho_{ij} \sigma_i \sigma_j \qquad \ldots\ldots\ldots\ldots (2.8)$$

where n is the total number of assets in the portfolio, W_i and W_j are proportions of funds invested in assets i and j, respectively, ρ_{ij}

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[6] Calculation of the mean parameter (used to measure expected return) and the variance or standard deviation parameter (used to measure risk) can be found almost in any statistics textbook. However, see the above footnote. Also for detailed discussion of the calculations of mean and variance within a portfolio approach see Jack Clark Francis, Appendix A to Chapter 14.

is the expected correlation between returns from both i and j, and σ_i and σ_j are the standard deviation about the expected return from respective assets.[7] The expected correlation ρ_{ij} can be expressed as

$$\rho_{ij} = \sum_{t=1}^{n} \left\{ \left[\frac{(r_{it} - E(r_i))}{\sigma_i} \right] \left[\frac{(r_{jt} - E(r_j))}{\sigma_j} \right] \right\} P_{tij} \quad . \quad (2.9)$$

Where P_{tij} is the joint probability that r_{it} and r_{jt} will occur simultaneously, and n is the total number of joint possible returns. In the case of a portfolio with n securities there should be $(n^2 - n)/2$ calculated correlation coefficients. Hence the application of Equation 2.8 becomes highly unfeasible even in the case of a moderate size portfolio. Sharpe has derived a model to simplify this calculation.[8] The essence of this model is to estimate the correlation between security returns and some index such as the GNP or Standard and Poor's 500 stock index. Accordingly, there is no need to calculate directly the correlation between the pairs of security returns.

The investor is concerned with how the asset's expected return $E(r_i)$ contributes to the expected return of the portfolio $E(R_p)$.

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[7] Equations 2.7 and 2.8 are the main Markowitz mean-variance model which is a basis to what is known as portfolio analysis approach. See Harry Markowitz Portfolio Selection and Harry Markowitz, Portfolio Selection: Efficient Diversification of Investments.

[8] William F. Sharpe, Portfolio Theory and Capital Markets, (New York: McGraw-Hill Book Company, 1970), Chapter 7.

Equations 2.5 and 2.7 show that the expected return from the portfolio is the weighted average of the expected return from the individual assets in the portfolio. Accordingly, this dissertation concludes that:

generalization #4: The expected return $E(r_p)$ from a portfolio depends directly on the expected return from the individual assets or securities in that portfolio.

The investor is also concerned with how the asset's risk σ_i contributes to the portfolio's risk σ_p. Equation 2.8 can be expanded so that a meaningful partial differentiation can be derived. That is,

$$\sigma_p = f(\sigma^2_p)$$

and

$$\sigma^2_p = f(W_i).$$

Thus, the partial derivative of the portfolio's risk with respect to the proportion of funds W_i invested in asset i is:

$$\frac{\partial \sigma_p}{\partial W_i} = \frac{\partial \sigma_p}{\partial \sigma^2_p} \cdot \frac{\partial \sigma^2_p}{\partial W_i} \qquad \ldots\ldots\ldots\ldots (2.10)$$

However, we have $\dfrac{\partial \sigma^2_p}{\partial \sigma_p} = 2\sigma_p$

and the inverse is $\dfrac{\partial \sigma_p}{\partial \sigma^2_p} = \dfrac{1}{2\sigma_p}$ $\qquad \ldots\ldots\ldots\ldots (2.11)$

Also, $$\frac{\partial \sigma^2}{\partial W_i} = \frac{\partial(\sum_{i=1}^{n}\sum_{j=1}^{n} W_i W_j \rho_{ij}\sigma_i\sigma_j)}{\partial W_i}$$

$$= 2\sum_{j=1}^{n} W_j \rho_{ij}\sigma_i\sigma_j \qquad \ldots\ldots\ldots\ldots (2.12)$$

Therefore, by substitution of equations 2.11 and 2.12 for equation 2.10, the following equation is obtained.

$$\frac{\partial \sigma_p}{\partial W_i} = \frac{\sum_{j=1}^{n} W_j \rho_{ij}\sigma_i\sigma_j}{\sigma_p} \qquad \ldots\ldots\ldots\ldots (2.13)$$

Equation 2.13 gives the marginal contribution of asset i to the risk of the portfolio. In other words, it shows the rate of change in the standard deviation of the portfolio's return caused by a change in the proportion of funds invested in asset i. Therefore, the second term of Equation 2.13 is an adequate measure of the asset's risk. The portfolio's risk consists of the weighted average of the pairwise covariances $\rho_{ij}\sigma_i\sigma_j$ between the returns of assets in the portfolio. Hence, the risk of individual assets should be looked at within a portfolio context, for this risk is largely affected by the correlation ρ_{ij} of the asset's expected returns with the expected returns on other assets. Accordingly, this dissertation concludes that:

generalization #5: The risk of the security σ_i, as well as the risk of the portfolio σ_p, depend very little on the variability of the security's expected return and to a very large extent on the covariance of the security's expected return with the expected returns on other securities in the portfolio.

A correlation coefficient of 1 means that the returns from both assets vary directly in the same proportional manner. A $\rho_{ij} = -1$ indicates that both returns vary inversely in exactly the same proportional manner. Thus, the greater the negative correlation or the less the positive correlation, the less the marginal risk of the asset. This is the essence of diversification to lessen risk.[9]

With the knowledge of the impact of the expected returns and risks of the individual assets on the expected return and risk of the portfolio, an individual is able to make optimal investment/consumption decisions. The investment of I = W-C is optimal if the decision balances the differences between the expected returns on various assets and the differences between marginal dispersion of the portfolio's returns resulting from changes in the proportions invested

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[9]Michael C. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," Journal of Business, XLII (April 1969), pp. 167-247; William F. Sharpe, Portfolio Theory and Capital Markets, Chapters 2-7; John Lintner, "Security Prices, Risk, and Maximal Gains from Diversification," Journal of Finance, XX (December 1965), pp. 587-615.

in these assets. The problem can be expressed mathematically as a system of linear equations that should be solved simultaneously to determine the values of the decision variables. From Equations 2.7 and 2.8 this system can be developed.

$$\text{Minimize} \quad \sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} W_i W_j \rho_{ij} \sigma_i \sigma_j \quad \ldots\ldots\ldots\ldots \quad (2.14)$$

$$\text{Subject to } E(R_p) = \sum_{i=1}^{n} W_i . E(r_i) \quad \ldots\ldots\ldots\ldots \quad (2.15)$$

$$\sum_{i=1}^{n} W_i = 1 \quad \ldots\ldots\ldots\ldots \quad (2.16)$$

The solution of this system through the technique of substitution and elimination of variables is tedious.[10] Therefore, by using the Lagrange multiplier method whose purpose is to "convert a constrained-extremium into a form such that the first order condition of the free extremium problem can still be applied,"[11] the solution is simplified.

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[10]A solution to this system by using the said technique can be found in Eugene F. Farma and Merton H. Miller, The Theory of Finance, (Holt, Rinehart and Winston, Inc., 1972), pp. 279-285.

[11]Alpha C. Chiang, Fundamental Methods of Mathematical Economics, (McGraw-Hill Book Company, 1967), p. 350; Also an interesting reference in this subject is William J. Baumal, Economic Theory and Operations Analysis, (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1972) Third Edition, pp. 60-65, 129-130, and 151-156.

Accordingly, the above system is re-expressed in Lagrangian as the following.

$$Z = \sum_{i=1}^{n} \sum_{j=1}^{n} W_i W_j \rho_{ij} \sigma_i \sigma_j + \lambda_1 \{ \sum_{i=1}^{n} W_i \cdot E(r_i) - E(R_p)\} + \lambda_2 (\sum_{i=1}^{n} W_i - 1) \quad \ldots (2.17)$$

Differentiating with respect to W_i and W_j

$$\frac{dL}{\partial W_i} = \frac{\partial (\sum_{j=1}^{n} W_j \rho_{ij} \sigma_i \sigma_j)}{\partial (W_i)} + \lambda_1 (E(r_i)) + \lambda_2 \quad \ldots \ldots \ldots (2.18)$$

$$\frac{dL}{dW_j} = \frac{\partial (\sum_{i=1}^{n} W_i \rho_{ij} \sigma_i \sigma_j)}{\partial (W_j)} + \lambda_1 (E(r_j)) + \lambda_2 \quad \ldots \ldots \ldots (2.19)$$

Equating both Equations 2.18 and 2.19 and setting the result equal to zero

$$\frac{\partial (\sum_{j=1}^{n} W_j \rho_{ij} \sigma_i \sigma_j)}{\partial W_i} + \lambda_1 \{E(r_i)\} + \lambda_2 - \frac{\partial (\sum_{i=1}^{n} W_i \rho_{ij} \sigma_i \sigma_j)}{\partial W_j} - \lambda_1 \{E(r_j)\} - \lambda_2 = 0.$$

Therefore, $$\{ \frac{\partial (\sum_{j=1}^{n} W_j \rho_{ij} \sigma_i \sigma_j)}{\partial W_i} - \frac{(\sum_{i=1}^{n} W_i \rho_{ij} \sigma_i \sigma_j)}{\partial W_j} \} = \lambda_1 \{E(r_i) - E(r_j)\}$$

Dividing both sides by λ_1 results in:

$$\frac{1}{\lambda_1}\left\{\frac{\partial\left(\sum_{j=1}^{n} W_j \rho_{ij} \sigma_i \sigma_j\right)}{\partial W_i} - \frac{\partial\left(\sum_{i=1}^{n} W_i \rho_{ij} \sigma_i \sigma_j\right)}{\partial W_j}\right\} = \{E(r_i) - E(r_j)\} \quad . . \quad (2.20)$$

Therefore, Equation 2.20 determines the equilibrium point at which the difference between the marginal effects of the assets on the risk of the portfolio (the first part of the equation) is just equal to the difference between the returns on these assets (the second part of the equation). In other words, Equation 2.20 determines the efficient values of W_i and W_j that should be invested in assets i and j, respectively.

Note on the left side of Equation 2.20 that λ_1 is the shadow price per unit of risk, and that the values in the parentheses are the marginal risks of assets i and j, respectively. Moreover, in considering the addition of another asset to the portfolio (a group of assets) already owned, the previous interpretation of Equation 2.20 amounts to saying that the proportion to be invested in that asset must be chosen in a way that balances the difference between the expected return on the asset and that on the portfolio with the difference between the asset's marginal risk and the total weighted average of the portfolio's risk. Accordingly, this dissertation concludes that:

generalization #6: "determination of a security's expected return E(r) and risk σ involves uncertainty which faces the individual with a most unpleasant situation in making his

investment decision. Therefore, adequate accounting information should be made available to predict the expected return/risk characteristics of the firm's securities. Both expected return and risk are of equal importance in decision-making and accordingly, accounting measurement should give them equal attention."

Basic Data for Expected Return/Risk Analysis:

This section is to investigate the overall quality of the input data which is needed to carry out an appropriate expected return/risk analysis for financial decision-making. Nevertheless, accounting measurement and communication of information should be directly concerned with the quantity and quality of such input data.

Previous discussion of investment/consumption decision has emphasized mean/variance, or "expected return/variance of return analysis". Accordingly, expected return and risk were assumed to be given. However, the ability of this analysis to give useful results depends upon the ability of the investor to formulate his probability beliefs concerning expected return and risk.[12] Different investors could have different concepts of income or expected return

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[12]For an explicit procedure to estimate risk and return see Jack Clark Francis and S. Archer, Portfolio Analysis, (Englewood Cliffs, New Jersey: Prentice-Hall, 1971), Chapter 3.

as well as different reactions to risk. That is, while some investors are interested in steady future income, others may be interested in capital gains. However, regardless of how the concept of income is defined and what reaction an individual may have to risk the previous approach of portfolio analysis is still applicable to his investment decision. Howard and Crary pointed out that

> "The entire field of security valuation has been augmented by portfolio theory. But portfolio theory does not reduce the problem of having to form expectations about the stream of benefits to be received."[13]

Nevertheless, the adequate use of this investment approach presumes the appropriate estimation of input data as a specific requirement before one can proceed to the portfolio analysis problems. Therefore, the analyst should make sure that the historical data of various security returns, which is to be used in estimating expected return and risk parameters, do express the economic significance of the operations of the related firms. Accordingly, this dissertation concludes that:

> generalization #7: Expressing the economic significance of the operations of a business enterprise is the highest informational quality that accounting measurement should emphasize. Hence, the idea of uniform accounting practices for all business enterprises is rejected, for the

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[13] R. H. Howard and D. T. Crary, "Forming Expectations about Firm Performance Under Inflation," Journal of Eastern Finance Association (1973).

measurement of the economic significance of the operations of two firms, different by nature, may require the use of different methods of depreciation and inventory valuation, etc. Business transactions and events of various firms have different physical attributes that can affect the economic significance of their activities. Thus, uniformity of accounting practices should be narrowed down to cover firms with identical operations.

generalization #8: Information about specific investment assets or security return possesses an economic significance in decision-making, not in its own right, but in relation to the information of other assets or securities' returns. Accordingly, the use of the co-variance and the expected return of various securities for decision making, presumes the comparability of their source data. That is, such data do represent the economic significance of the activities of the concerned firms. However, if the economic significance of various business operations is set as the basis of accounting measurement, then comparability of source data is automatically maintained and protected. Thus, the measured economic significance of the activities of individual accounting

entities is the appropriate basis for facilitating understanding of the relationships and differences among various entities which is the essence of comparability.

generalization #9: The portfolio analysis approach assumes that, although the expected returns and risks of various securities are merely estimates and have no absolute truth in themselves, when they are compared with each other, they do command a relative truth of great economic significance in decision-making. This gives rise to the "relative" truth of accounting measurement and communication of information. Accordingly, there may be cases where the economic significance of some business events or operations can not be measured in terms of absolute truth, but should be measured relative to some common standard so that a relative truth can be obtained. That is, business analyses deal to a large extent with uncertainty; accordingly, truth may be measured only in relative terms.

However, expected return and risk parameters may be obtained through projecting past costs and revenues into the future. Historical statistical data and/or personal judgment may be used to originate cost and revenue functions. There are several mathematical forecasting techniques, such as multiple regression, linear programming,

and break-even analysis, that can be used. Also, there are several publications on forecasting which are potentially useful.[14]

At this point, however, it is useful to elaborate more on the definition and measurement of risk. Francis has divided total risk into systematic risk and unsystematic risk.[15]

Systematic risk

Systematic risk is that portion of total variability of return caused by factors affecting the prices of all marketable securities. Blume found that about 30 percent of the variation in stock prices in NYSE can be explained by variation in the market index.[16] Stock prices of companies that provide the economy with basic products and durable goods and services such as railroads and rubber firms, are found to follow the performance of the economy and security markets. Knowledge of the firms with high systematic risk makes it easy to formulate the probability distribution of the related expected return. Sources of systematic risk as defined by Francis may be regrouped as:

Interest rate risk[17] - the variability of returns caused by changes in the interest rate. Changes in interest rate tend to affect

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[14]Roger K. Chisholm and Gilbert R. Whitaler, Jr., Forecasting Methods, (Richard D. Irwin, Inc., Homewood, Illinois, 1972) Third Printing; Jan Walter Elliot, Economic Analysis for Management Decisions (Richard D. Irwin, Inc., Homewood, Illinois, 1973).

[15]Jack Clark Francis, Investment: Analysis and Management, (McGraw-Hill Book Company, 1972), pp. 255-2651.

[16]M. D. Blume, "On the Assessment of Risk," Journal of Finance, March 1971, p. 4.

[17]H. Sauvain, Investment Management (Englewood Cliffs, N.J.: Prentice-Hall, 1967) Third Edition, Chapter 7.

nearly all securities. The prices of these securities move inversely to the changes in interest rate. The prices of fixed income securities, i.e., bonds, are affected by this risk more than common stock. Therefore, common stocks may have greater business risk than bonds, but they have less interest rate risk.

Purchasing power risk - the decline in the value of investments as a result of inflation. Fixed income securities are more subject to this risk than common stock. Unless inflation is anticipated by creditors and provided for in the interest rate, it is very likely that the creditors will suffer heavy losses while debtors will benefit from the decline in the real value of their debt. Investment advisors tell investors that buying common stock provides income above that needed to cover purchasing power losses. However, empirical research by Reilly, Johnson, and Smith disproves this idea by showing that[18] (a) over twelve years of inflation, common stocks provided a return about equal to the rate of inflation, (b) in the period between 1946-1949 the real rates of return on common stock were negative and (c) industrial stocks are better hedges against inflation. On the other hand, Howard and Crary attacked the idea of common stock as a proper hedge against inflation on the ground that

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[18] F. K. Reilly, G. L. Johnson, and R. E. Smith, "Inflation, Inflation Hedges and Common Stock," Financial Analysis Journal, January-February 1970, Vol. 26, No. 1, pp. 104-110. See also in this subject H. Sauvain, Investment Management, Chapter 6.

evaluation of common stock for that purpose may result in the wrong decision because current accounting practices don't provide adequate information about inflation risk.[19] They argue that in order to use the dividends valuation model (to be discussed in the next chapter) and/or the portfolio approach above, one must be able to form expectations about future dividends that the firm can pay. These expectations must consider an adjustment for expected inflation. However, if the formulation of these expectations is focused on the firm's earnings, the investor may be led to an erroneous conclusion. This occurs because current accounting practices don't provide the investor with information concerning whether earnings are retained to (1) maintain the firm's real productive capacity through replacement of its assets; (2) to meet growth potential requirements; or (3) to pay dividends in the future. Howard and Crary used a numerical example to show that a firm's earnings which increase faster than inflation as well as an increasing percentage of these earnings being retained may lead an investor to conclude that the firm has numerous excellent investment opportunities and the retention of earnings is warranted to provide even higher dividends in the future. Then they showed that if the investor evaluates real cash flows, he will discover that eranings are being retained not to seize exciting investments but only to maintain the firm's real productive capacity. Accordingly, inappropriate accounting

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[19] R. H. Howard and D. T. Crary.

for inflation factors may lead to erroneous decisions by management and investors. Moreover, Davidson and Weil have empirically tested the effect of general price level adjustments (GPLA) on the conventional accounting measurement of income in three articles.[20] Their major conclusion is that the effect of GPLA on the conventionally reported income differ substantially among firms. Accordingly, one may conclude that the accounting measurement should provide adequate information about inflation risk.

Market risk - market fluctuation caused by surprising news which in turn brings the changes of heavy losses. The true value of fixed income securities can be estimated more accurately than that of common stock. Accordingly, prices of fixed income securities are less affected by market risk.

Unsystematic risk

Unsystematic risk is that portion of total risk which is unique to a firm or industry. Therefore, it must be forecasted separately for each firm. Firms which produce nondurable goods (e.g., tobacco and liquors) tend to have a greater proportion of unsystematic risk and a smaller proportion of systematic risk. Since the factors causing the unsystematic risk are unique for a firm or for a few firms, this risk is diversifiable. The sources of unsystematic risk may be regrouped as:

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[20]Sidney Davidson and Roman L. Weil, "Inflation Accounting: What Will General Price Level Adjusted Income Statements Show?" Financial Analysts Journal (January-February 1975), pp. 27-31, 70-84; Davidson and Weil, "Inflation Accounting: Public Utilities," Financial Analysts Journal (May-June 1975), pp. 30-34, 62; Davidson and Weil, "Impact of Inflation Accounting on 1974 Earnings," Financial Analysts Journal, (September-October 1975), pp. 42-54.

Financial risk,[21] This risk arises when the investor becomes subject to losses on his investment as a result of the firm's inability to fulfill its financial obligations. Financial risk increases with (1) leverage or borrowing; (2) volatility of sales and/or raw materials; (3) declining competitive position because of product obsolescence, inadequate quality and pricing, etc.; (4) shortage of working capital; and (5) inadequate management and labor force. Financial risk decreases with (1) technological advances; (2) monopolistic patents; (3) consumer acceptance; (4) control of raw materials; and (5) equity financing base.

Management risk - the failure of management and the labor force to carry out their duties which increases the variability of return to investors. There have been many cases where companies with excellent past operating performance have suddenly collapsed and been forced into bankruptcy because of labor strikes, management errors, and frauds. Francis suggests that each firm's management team must be evaluated individually to determine its fitness. This is a difficult and deceptive assignment which only professional fundamental analysts and management consultants can carry on with any degree of regularity. However, this appraisal is particularly important to

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[21]See H. Sauvain, Investment Management, Chapter 5.

common stockholders whose investment returns are most sensitive to management actions.[22]

Industry risk: There are some risk factors, e.g., foreign competition, lack of raw materials and energy power, and strikes of some major labor unions, that are peculiar only to some industries. There are statistical data which may become of great significance if they are identified and classified with respect to each of the factors causing industry risk.

Accordingly, this dissertation concludes that.

> generalization #10: the division of total risk into systematic and unsystematic risk possesses a measured economic significance in making investment/consumption decision, for knowledge of these portions of risk is very basic to both risk diversification and ranking of assets for investment decisions. Data concerning many of the factors causing an asset risk may be classified as accounting information. Accordingly, the accounting function should investigate deeply this division of total risk with the hope of finding meaningful surrogates of measuring and reporting these factors.

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[22]Jack Clark Francis, Ibid., p. 264.

Risk Defined Within a Portfolio Framework Can Be Related Largely to Systematic Risk:

This section will discuss the feasibility of measuring an asset's risk and expected return in relation to some market return index, e.g., Standard and Poor's average, Dow Jones average and NYSE index. This will be done through the implication of the systematic risk mentioned previously. Although the method to be discussed is much more general than the measurement of risk within a portfolio context, it seems much easier to manage and use in practice, for the analyst does not have to specify a particular portfolio, nor is there any need to calculate a great deal of correlation coefficients as in the portfolio approach. The following discussion shall focus on delineating the differences between the said approach and the previously discussed measurement of risk within a portfolio context. Because of its appealing practicality the forthcoming discussion may be introduced into accounting procedures as a general rule for measuring and communicating expected return/risk characteristics of a business enterprise.

Sharpe was the first to develop an asset-pricing model which emphasized the implications of systematic risk.[23] The essence of Sharpe's model can be looked at as another verion of the

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[23]William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, (September 1964), pp. 425-552.

characteristic line model which was developed by Jack Treynor to assess systematic and unsystematic portions of total risk and to rate management of investment funds.[24] The characteristic lines is a least-squares regression line such that:

$$r_i = \alpha_i + \beta_i r_m + e \qquad \ldots\ldots\ldots\ldots (2.21)$$

where r_i is the rate of return from asset i, α_i is the regression intercept or the alpha coefficient and is an estimate of asset i's return when the market rate of return r_m is stationary ($r_m = 0$), β_i is the slope of the regression line or the beta coefficient, and e is a random error around the regression line. From equation 2.21 the asset'r risk or variability of return $\sigma^2(r_i)$ is:

$$\sigma^2(r_i) = \sigma^2(\alpha_i + \beta_i r_m + e).$$

Because α_i is a constant term, then

$$\begin{aligned}\sigma^2(r_i) &= \sigma^2(\beta_i r_m + e) \\ &= \sigma^2(\beta_i r_m + \sigma^2(e) \\ &= \beta_i^2\, \sigma^2(r_m) + \sigma^2(e) \qquad \ldots\ldots\ldots\ldots (2.22)\end{aligned}$$

Since β_i is the slope of the characteristic line, it serves as an index of systematic risk. Once β_i is multiplied by the variability (risk) of the market return index we obtain the systematic risk of asset i. On the other hand, the last term σ^2_e of the total risk of

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[24]Jack L. Treynor, "How to Rate Management of Investment Funds," Harvard Business Review (January-February 1965), XLIII, pp. 63-75.

asset i in equation 2.22, is left unexplained by the variatiliby of the market return index. Therefore, σ^2_e is a measure of the unsystematic risk. σ^2_e can be easily diversified away by naively investing in a portfolio of 10 to 15 different securities,[25] or even by investing in a fewer number of securities if Markowitz' portfolio selection technique is used.[26] Thus σ^2_e can be ignored and the risk-averse investor should focus his effort on minimization of the remaining part of the asset's total risk, namely the systematic portion. The elimination of σ^2_e leaves the asset's risk represented by

$$\sigma^2(r_i) = \beta_i^2 \sigma^2 (r_m),$$

$$\text{Thus } \sigma(r_i) = \beta_i \sigma (r_m) \quad \ldots\ldots\ldots\ldots (2.23).$$

Taking the derivative with respect to $\sigma(r_m)$:

$$\frac{\partial\sigma(r_i)}{\partial\sigma(r_m)} = \beta_i \quad \ldots\ldots\ldots\ldots (2.24).$$

Accordingly, the beta coefficient β_i can be looked at as the weighted average covariance of the asset return with the market return index r_m. In statistical terms, β_i can be expressed as the following:

$$\beta_i = \frac{\rho_{im}\sigma_i\sigma_m}{\sigma^2 r_m} \quad \ldots\ldots\ldots\ldots (2.25)$$

where ρ_{im} is the correlation coefficient between the asset's return and the market return r_m. Thus, by substitution of Equation 2.25

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[25] J. H. Evans and S. H. Archer, "Diversification and the Reduction of Dispersion: An Empirical Analysis," Journal of Finance, (December 1968), pp. 761-767.

[26] Harry Markowitz, "Portfolio Selection".

for Equation 2.23, another measure or representation of asset i's risk is obtained:

$$\sigma(r_i) = \frac{\rho_{im}\sigma_i\sigma_m}{\sigma r_m} \qquad \ldots\ldots\ldots\ldots (2.26)$$

However, since the correlation coefficient ρ_{im} can be statistically re-expressed as

$$\rho_{im} = \frac{Cov(r_i, r_m)}{\sigma r_i \, \sigma r_m}$$

by substitution of ρ_{im} for Equation 2.26, the asset's risk may be represented by

$$\sigma(r_i) = \frac{Cov(r_i, r_m)}{\sigma r_m} \qquad \ldots\ldots\ldots\ldots (2.27).$$

Therefore, there are two cases of measuring the risk of asset i. These are:

(1) in terms of the asset's marginal controbution to the portfolio's risk or variability of return. This is a risk measurement within a portfolio context. See equation 2.13.

(2) in terms of the affect of changes in market conditions represented in a market return index r_m, on the asset's risk. This is a systematic risk implication. (See Equations 2.26 and 2.27 above.)

Comparing these two cases, one may conclude that the covariance of the asset's return with returns on other assets is the central common factor in both cases of measuring an asset's risk. To be more explicit,

the numerator in Equation 2.13 can be re-expressed in statistical terms as

$$\sum_{j=1}^{n} W_j \rho_{ij} \sigma_i \sigma_j = \text{Cov}\,(r_i, \sum_{j=1}^{n} W_j r_j) = \text{Cov}\,(r_i, r_p) \quad \ldots\ldots \quad (2.28).$$

By substitution of Equation 2.28 for Equation 2.13, it is possible to obtain another expression of asset i's risk within a portfolio (p) context.

$$\frac{\partial \sigma r_p}{\partial W_i} = \frac{\text{Cov}\,(r_i, r_p)}{\sigma r_p} \quad \ldots\ldots\ldots\ldots \quad (2.29).$$

Now a comparison of Equations 2.29 and 2.27 indicates that some weighted average covariance of returns is central to the measurement of asset risk in both of the above cases. Accordingly, this dissertation concludes that:

> generalization #11: the importance of the covariance concept in measuring an asset's risk holds regardless of whether the security is analyzed within a portfolio context or in relation to some market return index, e.g., Standard and Poor's average, Dow Jones average, and NYSE index. When properly calculated, an asset's systematic risk (imposed by market conditions) is a good estimate of the asset's risk calculated in a harder way within a portfolio context. Thus, the division of total risk into systematic and unsystematic portions eases to a large extent the estimation and ranking of a security's risk/return characteristics.

This conclusion becomes even more evident if the measurement of asset i's risk within a portfolio context (as in Equation 2.29) of case (1) above is extended to the situation where this portfolio (p) becomes a very large market portfolio m such that it contains all other securities in the market. This is an outgrowth of the capital market theory. Of course, there is no real-life analogy to such a market portfolio, but it is a useful theoretical construct since the return R_m on portfolio m is the return that many market return indices are estimating.[27] Examples of these indices are the Dow Jones average, Standard and Poor's average, and NYSE index. Accordingly, using statistical manipulations similar to those leading to Equations 2.13 and 2.29 it is possible to obtain another measure of asset i's risk within the context of a very large market portfolio m, where the notations R and m stand for the statistical parameters of the market portfolio.

$$\frac{\partial \sigma_m}{\partial W_i} = \frac{\mathrm{Cov}(r_i, R_m)}{\sigma R_m} \qquad \ldots\ldots\ldots\ldots (2.30).$$

A comparison of Equations 2.27 and 2.30 indicates that with the change in the portfolio size to a very large one, the value of asset i's risk measured within a portfolio context (case 1) approaches the value of asset i's risk measured within systematic risk implications

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[27]Jack Clark Francis, Ibid., p. 408.

(case 2). The reason underlying this conclusion is that the market return index r_m (case 2) is assumed to be nearly approaching or approximating the return R_m of the market portfolio m .

Moreover, systematic risk analysis has the implication of an asset pricing model where beta can be used for ranking various assets in terms of their systematic risk. Empirical studies of the characteristic lines of hundreds of stocks have shown that about 25% of the total risk of NYSE securities is related to systematic risk and is impossible to diversify away.[28] In another study it was shown that unless the company undertakes major decisions, i.e., changes in management and/or product mix, the beta coefficient tends to be stationary over time.[29] The asset pricing is implicit in the characteristic line. Investors will increase demand for assets with low risk (β) and decrease demand for assets with high risk. Thus, assets with high risk will suffer price decline until their expected return becomes high enough to compensate for the high risk of that asset class. Assets with low risk will increase in price and their rate of return will decrease accordingly. Therefore, there is a positive relationship between an asset's risk and its expected rate

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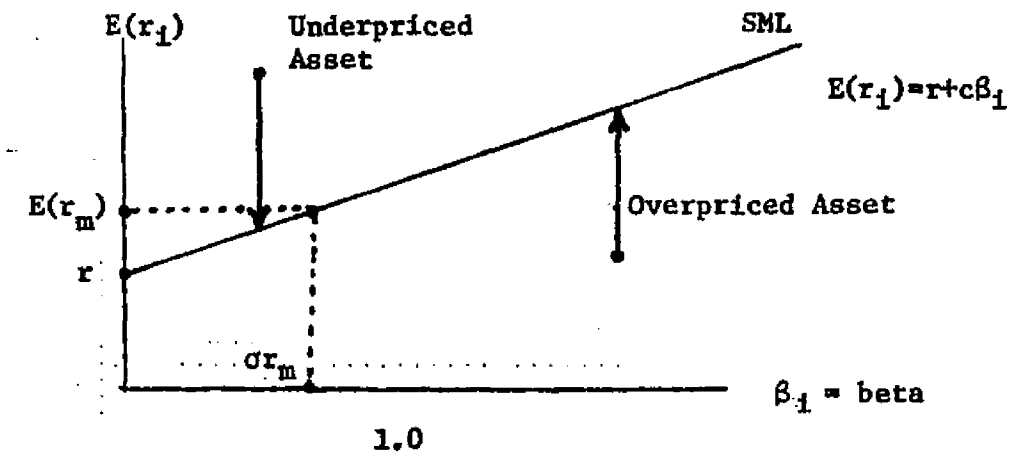
[28]B. F. King, "Market and Industry Factors in Stock Pricing Behavior," Journal of Business, (January 1966), Vol XXXIX, No. 2, Pt. 11, p. 15.

[29]Marshall E. Blume, The Assessment of Portfolio Performance: An Application of Portfolio Theory, unpublished Doctoral Dissertation, University of Chicago, March 1968.

of return. Such a trade-off between risk and return can be better seen by plotting the calculated expected return and risk of various assets on a graph as is done by Francis in his discussion of the SML (security market line).[30]



The SML is such that the average expected return of the i^{th} asset is set as a linear function of the asset's systematic risk.

$$E(r_i) = r + c\beta_i \quad \ldots\ldots\ldots\ldots \quad (2.31).$$

c is the slope of SML, r is the intercept or riskless rate of return, i.e., the expected rate of return when $\beta_i = 0$ (yield on U.S. government bonds would be a good estimate of r). β_i is the independent variable that determines the dependent variable $E(r_i)$. Accordingly, supply and demand forces the risk return $(\beta_i, E(r_i))$ points of both overpriced and underpriced assets closer to the SML.

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[30]Jack Clark Francis, Ibid., p. 274.

Using Equation 2.31 of Francis as the starting point the slope of the SML is

$$\frac{\partial E(r_i)}{\partial \beta_i} = c$$

therefore,

$$c = \frac{E(r_m)-r}{\sigma r_m} \qquad \ldots\ldots\ldots\ldots (2.32).$$

Also, from equation 2.24 the index of systematic risk β_i has three equivalent expressions

$$\frac{\partial \sigma(r_i)}{\partial \sigma(r_m)} = \beta_i = \frac{\rho_{im}\sigma_i\sigma_m}{\sigma^2 r_m} \qquad \ldots\ldots\ldots\ldots (2.33).$$

By substitution of Equations 2.32 and 2.33 for Equation 2.31, the asset's expected return becomes

$$E(r_i) = r + \left(\frac{E(r_m) - r}{\sigma r_m}\right) \frac{\partial \sigma r_i}{\partial \sigma r_m} \qquad \ldots\ldots\ldots\ldots (2.34).$$

Thus the equilibrium expected rate of return from security i on the SML consists of a riskless rate of return r plus a risk premium proportional to the security's risk, where the proportionality factor $S=C=(E(r_m)-r)/\sigma r_m$ and can be considered as the market rate of return per unit of risk. Accordingly, this dissertation concludes that:

generalization #12: The division of total risk into systematic and unsystematic portions is important, for in addition to easing the estimation of an asset's expected return/risk characteristics, it is also required for the

> determination of the risk premium which is appropriate to compensate for a particular degree of additional risk. Specifically, knowledge of systematic risk is needed to estimate the appropriate risk premium that should be added to the riskless rate of return to obtain the required expected rate of return from a particular security.

However, Francis indicated that some market imperfections, e.g., transaction costs, different tax rates on capital gains, and heterogeneous expectation, will preclude the attainment of complete equilibrium of all assets in terms of return/risk characteristics. Therefore, "in practice the SML is a band instead of a thin line. The width of this band varies directly with the imperfection in the market. As a result, the SML cannot be used to pinpoint an asset's equilibrium price. Instead, it can suggest only a range of prices for an asset."[31]

Investment Decision-Fundamental Analysts Approach

This section will discuss another approach to investment decsion-making known as fundamental security analysis. While this approach has its own peculiar characteristics it also depends on mean variance analysis, for it requires adequate consideration of risk factors. Therefore, the following discussion will investigate

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[31] Ibid., p. 276.

the nature of the information needed to perform this analysis as well as uncover some accounting difficulties that are said to face decision-makers who are using this approach.

The intrinsic value (IV) is the true economic worth of a financial asset.[32] The objective of fundamental security analysis is to estimate this value and use it as a basis for buying/selling decisions concerning a security. If the IV is more than the market price of the security it can be considered a bargain. If the IV is less than the market price, the security must be avoided or sold. IV can be appraised by two different methods.[33]

(1) capitalizing earnings: the essence of IV is that the value of any asset is the present value of future income from that asset. Thus IV per share is

(expected normalized earnings per share)(earning multiplier) . . . . . (2.35)

where

earning multiplier = price-earning ratio = 1/capitalization rate . . . . . (2.36)

(2) capitalizing dividends: Accordingly, IV per share is obtained by

(expected dividends per share)(dividends multiplier)

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[32] Ibid., p. 307.

[33] A detailed discussion of deriving multipliers for fundamental security analysis can be found in Cohen, J., and E. Zinbarg, Investment Analysis and Portfolio Management (Homewood, Il.: Irwin, 1967), Chapter 5, Jack Clark Francis, Chapter 11.

where dividends multiplier = $\frac{\text{earnings}}{\text{dividends}}$ (price-earning ratio) . . (2.37)

Substituting of Equation 3.36 for Equation 3.37, IV by capitalizing dividends is

(expected dividends per share) $(\frac{\text{earnings}}{\text{dividends}})$(earning multiplier) . (2.38)

Where normalized earnings per share is intended to mean an estimate of the economic income per share. Also, note that earnings multiplier is the reciprocal of the appropriate capitalization (discount) rate. Therefore, there are two groups of problems encountered in appraising the IV. The rest of this section is devoted to a summary discussion of these problems:[34]

Problems of estimating economic income.

The economist's concept of income seems to be generally accepted by fundamental analysts as being more reliable than reported accounting income.[35] Francis used a numerical example to distinguish between these two concepts of income. To him, the economist defines a firm's income as the maximum amount which can be consumed by the owners of the firm in any period without decreasing their future consumption opportunities.

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[34]A detailed discussion of the major problems to be raised here and others which center around fundamental security analysis are found in: Jack Clark Francis, Chapters 10 and 11; R. K. Jaeddicke and R. T. Sprouse, Accounting Flows: Income, Funds and Cash (Prentice-Hall Fundation of Finance Series, 1965); Graham, B., D. Dodd and S. Cottle, Security Analysis, 4th edition (New York: McGraw-Hill Book Company, 1962); Brealy, R. A., An Introduction to Risk and Return from Common Stock, (Cambridge, Mass.: M.I.T., 1969) Chapters 5, 6, 7, 8, and 9.

[35]R. K. Jaeddicke and R. T. Sprouse.

That is, most people's actions seem to imply that consciously or subconsciously they equate income with a sustainable level of consumption. The concept of economic income was suggested as a measure of sustainable consumption which is suited for fundamental security analysis.[36] Accounting income fails to reflect the true economic consequences of the firm's business transactions. Meigs, Johnson and Keller has indicated that:

> "Arriving at an estimate of the periodic income of a business enterprise is perhaps the foremost objective of the accounting process. The word estimate is, unfortunately, proper because income is one of the most elusive concepts in the business and economic world. The art of accounting has not progressed (and never will) to the point where periodic business income can be measured with certainty."[37]

Although fundamental analysts use accounting statements as a major source in estimating economic income, they still have to make several corrections and adjustments in accounting information because: (1) the latitude of alternative generally accepted accounting procedures causes the same economic event to be reported in several different ways, (2) pressure from top management to minimize the firm's income taxes may cause accounting information to be inadequately reported, (3) the IRS requires that if a given

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[36]Jack Clark Francis, pp. 285-294; For detailed discussion of this concept as it applies to fundamental security analysis see also R. K. Jaedicke and R. T. Sprouse.

[37]W. D. Meigs, C. E. Johnson, and T. F. Keller, Intermediate Accounting, (New York: McGraw-Hill Book Company, 1963), p. 87.

accounting procedure is used by a firm for tax purposes, it must also be used in its published financial statements. Hence, two income statements may be prepared; one, which minimizes income taxes, is made for the IRS and the general public and the other, to be kept confidential, is for management decision making.

The major accounting problems that deviate the measured accounting income from the economic income and seem to have been encountered by fundamental analysts are:

(1) Accounting for credit sales can be used to manipulate sales figures. For example, two identical firms, X and Y, sell on installment contract basis and they factor immediately the resulting accounts receivable. Thus, they realize the cash price of the sales contract. However, X includes all installment sales among total sales, while Y postpones the recognition of these sales until customers actually make cash payments. Both practices are acceptable, yet X's practice is a better reflection of the economic significance and cash flows of such sales transactions. Also, losing a sales contract which was reported as sales can badly distort sales trends. Bad debts may also be reported to distort sales. The notes to the financial statements may fail to mention these accounting inconsistencies.

(2) Inventory valuation may be changed in an effort to window dress the financial statements of the firm. Switching of inventory valuation, i.e., between *FIFO* and *LIFO*, may have nothing to do with physical movement of goods. LIFO is largely used for its tax

advantages. FIFO is generally presumed to be more realistic in expressing the economic significance of the firm's operations because it incorporates inventory capital gains or losses into regular income while LIFO does not.

(3) In the absence of heavy use of assets and changes in technology, straight line depreciation is generally regarded as a more appropriate way of expressing the economic significance of using these assets. Accelerated depreciation is largely used because of its desirable tax effects. Also, different assets may be depreciated by different methods and hence it becomes difficult for outside information users to analyze how these assets are depreciated. This difficulty is enhanced if depreciation methods are changed.

(4) Implicit costs; the economic income must also be netted for non-cash or implicit costs, i.e., owner's wage, and other opportunity costs. In appraising the income to be obtained from an asset, an investor must deduct these costs, which may be noncash expense to the present owner, but which is likely to be a cash expense to new owners.

Problems of estimating earning multipliers and earning growth:[38] Equation 2.35 shows that the earning multiplier is the reciprocal of the capitalization (discount) rate, K. Thus, another major job of fundamental analysts is to determine the appropriate discount rate, K. The main factors that should be considered in estimating K are

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[38]The following discussion of the problems is mainly based on Francis' approach to the estimation of earning multipliers and the earnings growth rate. See Jack Clark Francis, pp. 310-320.

(1) The risk class of the security: when most security prices are such that the average price/earnings (P/E) ratio is about 16 times, the security market is said to be a "normal market". If the average P/E ratio drops below about 14 times, the market is said to be deflated. When the average P/E ratio rises above 18 times, it is a bull market. Accordingly, the preliminary measurement of K is determined by making it a function of the firm's risk class under normal market conditions. Then the estimated K is adjusted further downward (the earning multiplier increases) or upward (the multiplier decreases) for risk factors, depending upon whether the market is inflated or deflated, respectively. The preliminary estimate of K under normal market conditions is usually made by projecting historical data through the SML technique discussed previously.

(2) The earning growth: Growth in EPS adjusted for any accounting inadequacies is the best indicator of the earning power standing behind the firm's intrinsic value. Sales, cash flows, dividends, or total dollar accounting profit is inadequate to estimate earning growth.

(3) Management valuation and financial ratios analysis: There are other functions of fundamental security analysts in determining a firm's earnings and risk. Thus working capital analysis, research and development programs, and competitive advantages are important factors concerning fundamental analysis. Management age, education, and past performance must also be taken into consideration by them.

Accordingly, this dissertation concludes that:

generalization #13: The essense of fundamental security analysis is to estimate the intrinsic value of the security as a basis for investment decisions. The main problems facing fundamental security analysis are the determination of (1) the economic income or normalized EPS that represents the economic significance of the firm's operations, and (2) the earning multiplier or reciprocal of capitalization (discount) rate. Systematic risk and earnings growth are major factors affecting the estimate of an appropriate discount rate. Therefore, expected return/risk analysis and related input data are also essential to fundamental security analysis.

Behavior of Security Prices and Investor's Economic Decisions

This section is a summary investigation of the contemporary literature concerning the impact of the phenomenon known as the efficiency of the security markets. Discussion of this phenomenon is important to see if it should effect accounting measurement and communication of information.

The security market is weakly efficient because historical price and volume data contain no information which can be used (as technical analysts or chartists contend) to earn a profit above what could be obtained by naive buy-and-hold strategy. Buy-and-hold strategy is the technique of randomly selecting securities and holding

them at least one complete business cycle while reinvesting all dividends. Empirical studies of testing filter rules,[39] serial correlation,[40] and run tests,[41] have supported this security market phenomenon. Also, the security market is semistrong efficient because security prices already reflect all publicly available information. Only a few investors who have access to inside information can earn, from short-run trading, a profit above that which could be earned by naive buy-and-hold strategy. Empirical studies on the effects of learning lags related to earning announcements,[42] changes in interest rates[43] and stock splits,[44] have supported this phenomenon of security market efficiency. Accordingly, Cootner has

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[39] E. F. Fama and M. E. Blume, "Filter Rules and Stock Market Trading," Journal of Business, January 1966, pp. 226-241; Eugene Fama, "The Behavior of Stock Market Prices," Journal of Business, January, 1965, p. 36; S. Alexander, "Price Movements in Speculative Markets: Trends or Random Walks," Industrial Business Review, May 1961, pp. 7-26.

[40] S. Alexander, op. cit., pp. 7-26; E. Fama, op. cit., p. 36; M. G. Kendall, "The Analysis of Economic Time Series, Part I," Journal of the Royal Statistical Society, 96 (1953), pp. 11-25.

[41] S. Alexander, op. cit., pp. 7-26; E. Fama, op. cit., p. 36.

[42] R. A. Brealy, An Introduction to Risk and Return from Common Stock, (Cambridge, Mass.: M.I.T., 1969), Chapter 3; R. Ball and P. Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, 6, Autumn 1968, pp. 159-178.

[43] R. N. Waud, "Public Interpretation of Discount Rate Changes: Evidence on the 'Announcement Effects'," Econometrica, 1971.

[44] E. Fama, L. Fisher, M. Jensen, and R. Roll, "The Adjustment of Stock Prices to New Information," International Economic Review, X, February 1969, pp. 1-21.

suggested that:[45]

(1) Security prices fluctuate randomly and this fluctuation is constrained around the intrinsic value of the security.

(2) Naive investors who have access only to public news, e.g., chartists, dart throwers, and speculators, are largely responsible for the hopeless fluctuation of security prices.

(3) Fundamental security analysts should be given the credit for correcting these price fluctuations by narrowing them down, whenever profitable, around the intrinsic values.

Fama, on the other hand, concluded from his study of the behavior of stock market prices, that the security market is an intrinsic-value random-walk market.[46] Accordingly, this dissertation concludes that:

> generalization #14: "Security markets are weakly and semi-strong efficient. Accordingly, naive investors, i.e., technical analysts or chartists, dart throwers, and speculators, who have access only to public news, are the ones responsible for the aimless fluctuation of security prices. Fundamental security analysts should be given the credit for correcting these fluctuations and narrowing them down close to the securities' true economic value. Accounting function should re-examine its responsibility as to

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[45]P. H. Cootner, "Stock Prices: Random Versus Systematic Changes," Industrial Management Review, Vol. 3, No. 3, pp. 24-45, Spring 1962.

[46]E. Fama, op. cit., p. 36.

lessening the heterogeneous expectations of investors and in turn the fluctuations of stock prices. If this can happen, a better performance of capital market would be achieved and, accordingly, economic resources would be more efficiently allocated and used in the direction of economic growth and social welfare.

CHAPTER III

ENVIRONMENT OF ACCOUNTING - EVALUATION OF THE FIRM IN RELATION TO ITS FINANCIAL DECISIONS

The Operating Objective of the Firm

Evaluation of the firm should be made in relation to some basic operating objective which is central to all its major decisions of investment, financing, dividends, and working capital management. Several competing objectives have been cited as being adequate for valuation purposes.[1] These include maximization of 1) profits, 2) EPS, and 3) value of the firm to its stockholders or maximization of wealth or net present value of the firm.

Profit is a suitable objective to the extent that it is used within the restricted sense of "profitability" and it is understood as an operational concept, e.g., choose optimum volume and combination of resources in order to maximize the economic wealth of the enterprise. Even under this restricted sense, Solomon has attached profit

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[1]See Weston, J. Fred, The Scope and Methodology of Finance, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1966) Chapter 2; Weston, "Toward Theories of Financial Policy," Journal of Finance, X (May, 1955), 130-43; Solomon, Ezra, The Theory of Financial Management, (New York: Columbia University Press, 1963) Chapter 2; Gordon Donaldson, Financial Goals: Management vs. Stockholders, (Harvard Business Review, 41) (May-June, 1963), 116-29; Herbert A. Simon, "Theories of Decision Making in Economics and Behavioral Science," American Economic Review, XLIX (June 1959), 116-29; Anthony, Robert N., "The Trouble with Profit Maximization," Harvard Business Review, 38(November-December, 1956), pp. 126-34.

maximization on the grounds that it does not offer an operationally feasible concept for evaluating alternative courses of action of the firm except under very limited assumptions.[2] Profit maximization is a very owner-oriented objective and it suffers from three flaws: (1) it is a vague concept that has different meanings to different people, (2) it can't help decide among alternative courses of action that offer benefits over different time periods, and (3) it ignores the risk associated with expected benefits, because, under conditions of uncertainty, neither the amount nor the rate of profitability provides a good basis for valuation. Accordingly, Solomon concludes that the operating objective for financial management is to maximize wealth or net present value. He has rationalized this objective in that it is consistent with the goals of owners, of society and also of management in the long run.

Van Horne also concludes that maximization of total profits is not as important a goal as that of maximizing EPS. This is because maximization of total profits can be accomplished by simply issuing common stock and investing the proceeds in riskless assets such as treasury bills. Even maximization of EPS is not as inclusive a goal as that of maximizing stockholders wealth. Maximization of EPS does not consider the effects of risk or uncertainty of expected earning streams as well as the effects of dividends policy on the well being of stockholders. For example, if the firm wants to maximize EPS

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[2]Ezra Solomon, The Theory of Financial Management, (New York: Columbia University Press, 1963), p. 19.

alone, it does not have to pay dividends and at the very least, the firm could always improve EPS by reinvesting its profits in treasury bills. But, since the payment of dividends can affect the value of the stock, the maximization of EPS can't be a satisfactory objective by itself. Accordingly Van Horne concludes that the most adequate objective of the firm is to maximize its value to its stockholders.[3] The value of the firm is represented by the market price of its common stock, which in turn, is the reflection of the firm's investment, financing, dividends, and working capital decisions.

Accordingly, this dissertation adopts the maximization of wealth (the firm's value to its stockholders) as the basic operating objective by which financial decisions should be guided and evaluated. Wealth is the net present worth measured by the difference between the capitalized value of the inflow of expected benefits and the present value of the investments needed to produce these benefits. A discount rate which includes an appropriate risk premium should be used. The value of the firm to its stockholders (represented by the market price of its stock) reflects the total judgement of the market as to what is the net present worth of that firm. The market price of the firm's stock is a more appropriate operating objective to be maximized because it is inclusive enough to reflect the firm's expected EPS, risk, dividends policy, growth, and other market

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[3]James C. Van Horne, Financial Management and Policy (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1971), Second Edition, pp. 7-9.

factors.[4] The market price serves as an index of the firm's performance and of what the management is achieving on behalf of its stockholders. Accordingly, this dissertation concludes that:

> generalization #15: Accounting measurement and communication of information should pertain to the evaluation of the entity being accounted for in terms of its effectiveness in achieving its operating objective. For a business enterprise, maximization of the value of the firm to its stockholders seems to be the most generally accepted operating objective that management should attain. Such an operating objective is generally considered neutral to all beneficiaries in the firm as well as it is economically feasible basis for decision-making under the conditions of uncertainty. Compared with the conventional objectives of maximizing total profits and maximizing EPS, maximization of the value of the firm to its stockholders is regarded as being more appropriate because in addition to the magnitude of profits it takes into consideration other factors such as risk factors, dividends decision, growth, etc.

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[4]For closely held firms that have no public market for their stock, the above operating objective is still valid because their values can be approximated by comparison with other firms of the same risk and size that have public market for their stock. Johnson, Shapiro, and O'Meara have developed a feasible approach to such approximation. See L. R. Johnson, Eli Shapiro, and Joseph O'Meara, Jr., "Valuation of Closely Held Stock for Tax Purposes: Approaches to an Objective Method," University of Pennsylvania Law Review, 100 (November, 1951), 166-195.

Evaluation of the Firm and the Relevancy of Accounting Measurement

Although the contemporary approach to a firm valuation in relation to the said operating objective has had no existance until almost the last two decades, the need for such valuation methods as well as adequate information for their application were conceptually recognized four and a half decades ago by the executive assistant to the committee on stock list of the NYSE. He argues that accounting measurement and communication of information should avoid misleading the stockholders in any respect and should aid them in determining the true value of their investment.[5] However, accounting measurement does not seem to have been adequately directed toward serving this purpose.

The change in accounting emphasis from that of providing financial information for management and creditors to that of providing information for stockholders and prospective inveators has been itself the result of the pressure from financial sectors and stock exchanges rather than that from the accountants.[6] On surveying the history and development of accounting theory, Hendriksen concluded that "while some professional accountants have been leaders in the development of accounting thought, accountants as a group have been slow to accept new ideas unless there has been a definite tax

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[5]J. M. E. Hoxsey, "Accounting for Investors," Journal of Accountancy, Vol. L (October, 1930), pp. 251-84.

[6]Eldon S. Hendriksen, Accounting Theory (Richard D. Irwin, Inc., Homewood, Illinois, 1969), p. 51.

advantage in so doing."[7] Presumably, the changes in accounting applications to achieve tax advantages are largely imposed by management because of its desires or needs for such accounting flexibility. Nevertheless, this semi-stationary position of accounting prrofession in relation to the developments in its environment is an unfortunate one.

The importance of orienting accounting measurement to the prediction of the firm's earning power and the changes in the value of its stock has been recognized, in principle, by many accountants. For example Hendriksen stated that

> "Historical income is water over the dam; the important decisions regarding the purchase or sale of stock or bonds of the firm or the making of a loan to the firm require expectations regarding the future. The current value of a firm or the value of shares of stock in the firm is dependent upon the future stream of services flowing from the invested capital. For the stockholder, the magnitude of this flow determines the possible future dividends and the possible increase in the value of the stock. A current stockholder may decide to sell his holdings or to hold them. An investor who is not currently a stockholder may decide either to purchase shares in the firm or to invest his capital elsewhere. Expectations regarding the future are paramount in these decisions."[8]

However, this view of Hendriksen is consistent with traditional business finance which recognizes the importance of expected return analysis alone and ignores risk or variability of return as another basis for valuation. The recent prudent valuation methods for making

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[7] Ibid., p. 47.

[8] Ibid., p. 101.

decisions under the conditions of uncertainty give both expected return and risk equal importance in financial analysis. That is, risk and valuation are inseparable; they are two sides of the same coin.[9]

Moreover, in the introduction to his discussion of the accounting concepts of income, Hendriksen realizes that

> ". . .already there are ramblings that the income statement will see its demise in the near future unless drastic changes are made to improve the story it tells. Some of the reasons for this potential demise are: (1) the concept of accounting income has not yet been clearly formulated; (2) generally accepted accounting practices permit inconsistencies in the measurement of periodic income of different firms and even between different years for the same firms; (3) price level changes have modified the meaning of income measured in terms of historical dollars; and (4) other information may prove more useful to investors and stockholders for the making of investment decisions."[10]

In this context, Hendriksen concludes his discussion by stating that a single concept of income is not likely to serve all objectives equally well. However, this writer feels that neither individually nor combined as they are contemporarily applied the conventional income concepts - namely, the transaction and the capital maintenance approaches - can serve properly and completely any of the objectives cited by Hendriksen[11]; distinction between capital and income,

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[9]Alexander A. Robichek, "Risk and the Value of Securities," Journal of Finance and Quantitative Analysis, Vol. 4, No. 4 (December 1969), p. 513; see also, Hsiu-Kwana, Wm. and Alan J. Zakan, Elements of Investment, Selected Readings, (Holt, Rinehart and Winston, Inc., 1972), p. 349.

[10]Eldon W. Hendriksen, p. 97.

[11]Ibid., p. 97-102.

income as a measure of efficiency, income as predictive device, and managerial decision making. This writer's reason for taking this position is theoretically twofold: (1) these concepts are too narrow to provide for an explicit treatment and reporting of such matters as risk factors, growth potential and managerial effectiveness etc.; and (2) both concepts contradict each other in application to the point that they lead to inconsistent and inconvenient financial information. As an example of this is the use of historical cost basis in accounting for some balance sheet items and current market price for other items. Under the transaction approach, changes in values are excluded if they result from changes in market valuation or changes in expectation alone. But adjustments for these changes and expectations at the end of each fiscal period are an implicit application of the capital maintenance approach. Although the need for making these adjustments - particularly price-level adjustments - has been advocated by many accountants and financial analysts the subject is still, however, a controversial matter. Theoretically, this last problem is partially due to a misunderstanding of the exact meaning of the capital maintenance concept, and accordingly, to disagreement as to how to make it operational. This concept has brought about two important yet largely interrelated and confusing issues:

(1) Its importance as an accounting concept for income measurement:

In this context, the capital maintenance seems to be

theoretically superior to the transaction approach in satisfying a part of the needs of information users because it implies somehow that changes in market values and expectations should be considered in the process of income measurement. But, it is a vague concept for there is disagreement as to which of the following methods will meet its precise meaning in application[12]: (a) market valuation of assets, (b) capitalization of net expected cash flows, (c) valuation of total equity, and (d) usage of input values and adjusting the net changes for capital transactions and dividends.

(2) Its importance as an operating concept for financial policies and decisions: That is, managerial decisions should be made consistent with the objective of preserving the firm's net worth. However, this writer considers that the preservation of the firm's net worth, in this context, is theoretically a questionable objective in itself. Preservation of the firm's net worth, other than decreasing it or increasing it, does not necessarily stipulate a good financial policy. There may be conditions where the firm's profitability diminishes and thus management may find it more feasible to make some disinvestment decisions and return a part of the capital to its owners. Any attempts to preserve the firm's productivity or capital level in this case will harm its

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[12] Ibid., pp. 102-110.

stockholders, creditors, as well as the society as a whole, because of inefficient allocation of capital. On the other hand, it may be to the better interest of these groups for the firm to invest more capital whenever there are good investment opportunities. Therefore, even if the firm is able to preserve a constant net worth it does not mean that its management has acted responsibly and effectively.

In turn, this entails that the accounting profession should assure itself of the economic validity of any operational concept, in the first place, before it is used in formulating its measurement techniques. Preservation of the firm's net worth, which is a matter unachievable by mere accounting entries, may be regarded as a minimum measure of success desirable by many information users including management which carries the burden of its attainment. In this restricted sense, preservation of the firm's net worth can become a sub-goal of the overall operating objective of maximizing the firm's value to its stockholders.

However, as far as the limitation of the accountants' responsibility regarding the application of the capital maintenance concept as a managerial financial policy is concerned, this dissertation is in full agreement with Hendriksen's point of view which reads,

> "While capital is still the stock of wealth that can provide future services, income is thought of as the flow of wealth or services in excess of that necessary

> to maintain a constant capital. Although most firms are thought of as relatively permanent in nature, it is not the responsibility of the accountant to see that the invested capital is preserved. This is the responsibility of management or possibly the decision of the owners or equityholders. The accountants' responsibility is to report the amounts that have been made available to the beneficiaries for their enjoyment or reinvestment and the change in the capital of the enterprise."[13]

Accordingly, financial decision-making is not the responsibility of the accounting function. Measurement and reporting of all favorable and unfavorable effects of these decisions, including the changes in the firm's net worth as opposed to the preservation of this net worth, is what should fall within the dominance of accounting function. Accounting procedures should be limited to the measurement and communication of all financial information that are economically significant for decision-making.

Furthermore, while the magnitude of the change in net worth (total profit) is an important factor in valuating the firm, it is an incomplete basis for this valuation and based-upon decision. Business risk, financial risk, growth potential and pattern, as well as managerial efficiency are other factors of equal importance in this regard. The possible effects of all these factors combine in the determination of a firm's expected return/risk characteristics which are the basic input data for its valuation. An enterprise valuation which explicitly requires the knowledge of the combined effect of all of these factors is a more inclusive concept than the capital

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[13] Ibid., pp. 98-99.

maintenance and the transaction approaches and therefore, it is more appropriate for the formulation of a set of principles to guide and evaluate accounting measurement and communication of information. Evaluation of the firm in term of its return/risk characteristics had become an important scientific concept in financial analysis concerning (1) buying and selling a firm's securities; (2) whether the earning power of the firm justifies more financing or disinvestment and reallocation of its capital; (3) whether the management is efficiently carrying out its stewardship function in comparison with other managements of other firms; (4) whether the firm will be able to fulfill its debt obligations. That is, stockholders, creditors, and prospective investors are interested not only in how much return they will receive from the enterprise in a particular year, but they are also interested to know the expected net changes in the earning power as well as the risk complexion of the firm and how these will affect the flow of wealth or income to the suppliers of capital and other beneficiaries. Accordingly, this dissertation concludes that:

> generalization #16: the capital maintenance concept, somehow, implies that the firm's net worth should be preserved, and accordingly, it confuses managerial policies and decisions with those of accounting. Management's decisions and professional accounting decisions should not be mixed up simply because of the so-called management's needs of accounting flexibility. Accountants and their instruments of measurement should not be

expected or used to cover the unfavorable economic effects on the firm's activities which result from the decisions of others. Also, the conventional capital maintenance and transaction approaches of income determination contradict each other in application and are too narrow to provide for an explicit accounting consideration to several economic factors, other than total profits, such as risk, dividends, growth, managerial efficiency, etc. Accordingly, measurement of accounting income has been emphasizing the information needs of decision-making of traditional business finance which ignores risk and puts great emphasis on expected return analysis alone. On the other hand, contrary to the conventional concepts of accounting income, the firm's operating objective of maximizing its value to its stockholders provides an evaluation concept which is more inclusive and flexible enough to provide for an explicit accounting treatment of nearly all economic factors that should affect financial decision-making. Theoretically, basing accounting measurement on the applications of this evaluation concept is more appropriate in providing buyers and sellers of the firm's securities as well as providing the management with adequate information to judge the current and future performance of the firm.

Value of the Firm - An Operating Objective Model

Using a firm's evaluation concept as a basis for accounting measurement requires a clear determination and understanding of the most generally accepted valuation models in practice. Accordingly, this section is to investigate and select among various available models, the one that is more relevant for the purpose of this dissertation. Generally, in order to qualify for serving this purpose, the model to be chosen must be capable of incorporating and considering all economic factors that affect the value of the firm.

The financial decisions of a firm can be divided into four major categories: investment, financing, dividends, and working capital decisions.[14] These decisions affect the value of the firm through their effect on the expected return/risk ($E(r)/\sigma r$) characteristics of its stock. Thus, these decisions should be considered in relation to the operating objective of the firm. Accordingly, the management should maintain the optimal combination of these decisions that will maximize the value of the firm to its stockholders. The combined impact of these decisions on the firm's $E(r)/\sigma r$ characteristics determines the view that investors maintain concerning the $E(r)\sigma r$ characteristics of their holdings in the firm's common stock. Peterson has categorized information regarding $E(r)/\sigma r$ characteristics of the

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[14]For detailed discussion of these topics see James C. Van Horne and Ezra Solomon.

firm's stock according to whether they result from investment, financing, or dividends decisions.[15]

There have been several attempts by theorists to develop a model to measure the value of the firm. These include Walter's model, Gordon's model, and Modigliani and Miller's model.[16] Gordon's stock valuation model seems to be the most generally accepted and supported by empirical research.[17] Concerning the usage of this model in studying the effects of risk on value, Francis has indicated that it

> "permits a more objective view of the real issues at question and facilitates empirical testing. Such model building has the obvious practical value of other valuation models (For example, the earnings multipliers used by fundamental analysts) and also valuable for studying practical problems of a more subtle nature such as the effect of retaining more earnings by postponing cash dividend payments."[18]

The essence of Gordon's model is the capitalization of expected dividends:

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[15]D. E. Peterson, A Quantitative Framework for Financial Management (Homewood, Illinois: Richard D. Irwin, Inc., 1969), pp. 28-29.

[16]For an interesting discussion of these models see: Jack Clark Francis, Investments: Analysis and Management (McGraw-Hill Book Company, 1972), Chapter 12.

[17]M. J. Gordon, The Investment, Financing and Valuation of the Corporation (Homewood, Ill.: Irwin, 1962), Chapters 6-14; M. T. Gordon, "Optimal Investment and Financing Policy," The Journal of Finance, May 1963, pp. 264-72; E. Lerner and W. Carleton, "The Integration of Capital Budgeting and Stock Valuation," American Economic Review, September 1964, pp. 683-702.

[18]Jack Clark Francis, pp. 354-55.

$$V = \sum_{t=1}^{\infty} \frac{D_t}{(1 + K_e)^t} \qquad \ldots\ldots\ldots\ldots (3.1)$$

Where current value V of the firm is equal to the present value of expected dividends D_t, to be received to infinity ($t \to \infty$). K_e is the equity capitalization rate. Gordon's model, beside its proven practicality, particularly in fundamental security analysis for calculating the intrinsic value of securities (See Chapter II) is important for it can be written in different forms to suit various relationships among earnings, dividends, and the growth rate of the firm. Assuming that D_o represents current dividends, b, retained earnings ratio, E earnings, and r the reinvestment rate of return, earnings will then grow at the rate $g = b_r$. Future dividends, D_t, can be represented as

$$D_t = E_o(1-b)\ (1+b_r) \qquad \ldots\ldots\ldots\ldots (3.2)$$

by substitution of 3.2 for equation 3.1 the present value of the stock becomes

$$V = \sum_{t=1}^{\infty} \frac{E_o(1-b)\ (1+b_r)}{(1+K_e)^t} \qquad \ldots\ldots\ldots\ldots (3.3)$$

If the equity capitalization rate, K_e, is greater than g then equation 3.3 becomes:

$$V = \frac{E_o(1-b)}{K_e - g} = \frac{D_o}{K_e - g} \qquad \ldots\ldots\ldots\ldots (3.4)$$

If the growth rate is not perpetual (as assumed above) an expansion of equation 3.3 should be made to portray the different periods with different growth rates. Soldofsky and Murphy have prepared tables to

obtain V under different combinations of g, D, t and K_e.[19]

Supposedly, in theory, sophisticated investors, such as fundamental security analysis will base their investment decisions on the comparison between market price and the calculated present value, v, of the stock. The calculated present values are likely to differ from one investor to another because these investors have different expectations of risk/return characteristics, different preferences, and financing abilities. However, assuming a particular supply of common stock, the intersection of demand and supply schedules will determine its current market price. Investors whose subjective present values correspond exactly to the market price are called "investors at the margin" and they are indifferent in regards to buying and selling the stock.[20]

The cost of equity capital, K_e, in Gordon's model may be defined as the minimum rate of return that the company should earn on the equity-financed portion of its investment projects in order to leave unchanged the market price of the stock, holding constant the

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[19]Robert M. Soldofsky and James T. Murphy, Growth Yields on Common Stock: Theory and Tables (Iowa City: Bureau of Business and Economic Research, University of Iowa, 1961).

[20]James C. Van Horne, p. 24; For detailed discussion of the supply and demand schedules of common stock, See: John Lintner, "The Aggregation of Investor's Diverse Judgements and Preferences in Purely Competitive Security Markets," Journal of Financial and Quantitative Analysis, IV (December, 1969), p. 398.

capital structure, dividends policy, and business risk.[21] Therefore, K_e is the minimum rate of return required by investors at the margin (who are at the intersection of the stock's supply and demand schedules) on the equity financed portion of the firm's investments. Accordingly, sound investment decisions require that the management should estimate K_e as it is perceived by investors at the margin. One way of doing this is to solve for K_e in Gordon's model. But this in turn will require management to estimate the numerator or expected dividends, D_t, as they are also perceived by investors at the margin. However, expected growth in dividends represents a major difficulty facing management because it is not directly measurable. Van Horne has indicated that the financial manager should answer the important question:

> "What growth in dividends do investors at the margin expect that leads them to pay x dollars for a share of stock? Every effort should be made to get as accurate a handle as possible on his expected growth pattern. . . Thus the financial manager must think as investors do when he estimates the cost of equity capital for his firm. . . To be sure, this approach lacks precision. Nevertheless, estimates must be made."[22]

According to Gordon's model, investors determine the required minimum rate of return, K_e, by adding an appropriate risk premium to a riskless rate of return. Gordon suggested that because risk increases the further into the future investors look, the appropriate K_e should be increased to compensate for the increase in risk.

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[21] James C. Van Horne, p. 93.

[22] Ibid., pp. 97-98.

Accordingly, the discussion of the SML (Chapter II) is essentially consistent with Gordon's view of determining K_e where it was concluded from equation (2.34) that the equilibrium expected rate of return from security i on the SML consists of a riskless rate of return r, plus a risk premium M proportional to the security's risk. r may be approximated by a certain future rate of return such as the yield on treasury bills. If K_e is represented by

$$K_e = r + M \qquad \ldots\ldots\ldots\ldots (3.5)$$

Then, based on equation (2.34) of the SML, the risk premium M may be represented by

$$M = \left[\frac{E(r_m)-r}{\sigma r_m} \right] \frac{\partial \sigma r_i}{\partial \sigma r_m} \qquad \ldots\ldots\ldots\ldots (3.6)$$

But from equation (2.33)

$$\frac{\partial \sigma r_i}{\partial \sigma r_m} = \beta_i = \frac{\rho_{im} \sigma r_i \sigma r_m}{\sigma^2 r_m}$$

Thus equation 3.6 may be rewritten as

$$M = \left(\frac{E(r_m)-r}{\sigma r_m} \right) \left(\frac{\rho_{im} \sigma r_i \sigma r_m}{\sigma^2 r_m} \right) \qquad \ldots\ldots\ldots\ldots (3.7)$$

Moreover, from a portfolio point of view, Sharpe and Lintner have indicated that M can be measured by the model.[23]

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[23] M. C. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," Journal of Business, XXXXII (April, 1969), 176-77.

$$M = \frac{(R_p - i)(r_{jp}\sigma_j\sigma_p)}{\sigma^2} \qquad \ldots\ldots\ldots\ldots (3.8)$$

Where (p) refers to portfolio, i is the riskless rate of return, and r_{jp} is the correlation coefficient between the returns from asset j and portfolio p. Therefore both expressions (3.7) and (3.8) are similar, although equation 3.7 is derived from (SML) the regression of the security's returns against some market return index, while equation 3.8 is derived from a portfolio point of view. The implication of the Sharpe-Lintner model is similar to the previously discussed conclusion concerning the measurement of an asset risk within a portfolio context (call this case 1), where the risk of security i depends on the covariance or correlation of its expected return (dividends), with expected returns from other securities in the portfolio. In (SML) terms (call this case 2), the risk of the security depends on its systematic risk or the covariance of its expected returns (dividends) with some market return index. We find, however, under both cases 1 and 2 (namely, the measurements of marginal risk and systematic risk respectively) that the greater the negative covariance or the lesser the positive covariance, the lesser the related measured asset risk. Accordingly, the lesser is the risk premium to be added to K_e.

The risk premium, M, may be broken down into two portions: 1) premium for business risk B, caused by variation of the probability distribution of expected operating income, and 2) financial

risk, F, caused by variation of expected dividends available to common stockholders. Accordingly, risk premium may be expressed as:

$$M = B + F \quad \ldots\ldots\ldots\ldots (3.9)$$

The factors that can change K_e through their affect on risk premiums may be grouped in the following manner:

1) Change in the composition of the firm's assets affects its earning power and in turn affects its business risk.
2) Change in the firm's leverage affects future earnings available to common stockholders and in turn affects its financial risk.
3) Economic conditions such as recession are likely to (a) lower interest rate or the riskless rate of return r, and (b) increase the unfavorable expectation regarding the firm's operating income and in turn its ability to pay dividends. Thus both portions of B and F of risk premium are likely to increase.
4) Malkiel, has found that the above factors are not as effective in changing K_e as are the investors expectations of the firm's growth.[24] It is found that the greater the preceived growth the greater the fluctuation of the market price of the firm's stock. This may explain why growth stock suffers more severe price fluctuations.

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[24]B. G. Malkiel, "Equity Yields, Growth, and the Structure of Share Prices," American Economic Review, LIII (December, 1963), 1004-31.

Accordingly, this dissertation concludes that:

generalization #17: Gordon's dividends valuation model, or some version of it, is generally considered appropriate for evaluating the firm in relation to its operating objective. All factors that effect the value of the firm can be incorporated into this model. The discount rate in Gordon's model is the cost of equity capital, K_e, or the minimum rate of return on the equity financed portion of the firm's investment projects, required by investors at the margin in order to leave unchanged the market price of its common stock. K_e should include a risk premium M, which may be defined as consisting of B, a premium for business risk, and F, a premium for financial risk. Thus K_e and, in particular, its portion of risk premium is the dynamic connecting link between decisions of the firm and decisions of investors. As such, it directly affects the value of the firm. The financial management must think as investors do when it estimates K_e for its firm. The estimate of future dividends (required to solve for K_e) as preceived by investors is a major problem. Nevertheless, these estimates must be made. Accordingly, appropriate accounting measurement and communication of the firm's dividends and related policies should narrow down and improve the investors' views of future dividends. This in turn makes the investors perception of expected dividends more adequately predictable.

The Relation of Cost and Structure of the Firm's Capital to its Operating Objective:

The generally accepted valuation model depends on the capitalization of the future stream of dividends by adding to the discount rate a risk premium which is appropriate for the risk class of the firm's stock. However, whether the financing mix can affect the value of the firm through its affect on such a risk premium is an important question whose answer should affect financial decision-making and accordingly, it should affect accounting measurement and communication of information. Therefore, this section is devoted to find an answer to this question by examining the research available regarding the possible impact of the cost and the structure of a firm's capital on its value.

The cost of capital, K, is obtained by taking the weighted average of the costs of the individual components of the firm's capital structure;[25] that is, the weighted average of K_e-cost of equity capital K_d-cost of debt, K_p-cost of preferred stock, and K_r-cost of retained earnings. Accordingly,

$$K = \frac{K_e W_e + K_d W_d + K_p W_p + K_r W_r}{W_e + W_d + W_p + W_r} \qquad \ldots\ldots\ldots\ldots (3.10)$$

Where W_e, W_d, W_p and W_r are the proportions of the components of the firm's capital structure. K_d may be obtained by solving for the

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[25]For more detailed discussion of this concept, See James C. Van Horne, Chapter 4; and Ezra Solomon, Chapter III.

discount rate, which equates the net proceeds from debt issuance with the present value of interest expense plus principal payments, and then adjusting K_d downward for tax savings affects. K_r may be approximated by the minimum K_e cost of equity capital. K_p is a function of the rate of return approximated by the amount of stated dividends. However, when the security is a convertible one, estimation of its cost requires the determination of both the expected income (dividends or interest payments) of the security and the market price of the shares into which the security is convertible at the end of the horizon period. But the estimation of the market price per share of common stock entails in turn the estimation of its expected dividends stream. Therefore the major problem in applying equation 3.10 is encountered in the estimation of K_e and also of K_d when the security is a convertible one. This problem arises from the need to estimate expected dividends in both cases.

Cost of capital may be regarded as the rate of return that should be earned on investment projects to leave unchanged the market price of the firm's stock. K is being used as a cutoff rate for the allocation of capital because it is the minimum rate of return that should be earned to justify the use of the firm's economic resources. Thus, if K can be reduced, it will increase the firm's ability to find new wealth-creating investment opportunities.[26] There are

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[26]Ezra Solomon, p. 92.

several methods of allocating capital to investment projects by using the inference of K, i.e., net present value method (NPV) internal rate of return (IRR) method, etc. The essense of using K is that if it is continuously used in accept/reject investment decisions, the value of the firm would be maximized over the long run. The critical assumption in using K, however, is that capital should be raised marginally in the proportion W_e, W_d, W_p, and W_r, to make marginal investments. Therefore, the firm should determine and use its cost of capital based on some desired capital structure in the future. This suggests that the cost of capital can't be determined in isolation from the firm's need for capital. Financing decisions and investment decisions should be determined simultaneously, as the amount of capital needed is determined either by the availability of profitable investment opportunities or by the point where the last project to be accepted offers an IRR just equal to K cost of capital. Therefore, the whole question of cost and structure of capital should be considered in relation to their impact on the value of the firms to its stockholders. There has been a lot of debate concerning whether the capital structure does matter in the sense that it affects the value of the firm. Basically there are two major theories which represent opposite positions on this subject.

(1) The traditional theory of capital structure emphasizes that capital structure does matter where there should be an optimal capital structure with which the firm is able to reduce

its K to a minimum and accordingly increase its value to a maximum.[27] If the firm is able to borrow money at an effective interest rate lower than the rate which it can earn on its assets, the difference will acrue to the stockholders as an increase in the rate of return on equity.[28] Thus, an optimal capital structure depends upon the judicious use of leverage or debt/equity (B/S) ratio. As the firm increases its leverage, it becomes more financially risky. Accordingly, investors in the stock market penalize its stock by increasing K_e. But such increase in K_e does not offset all the benefits of using cheaper debt financing. As a result of judicious use of leverage, K continues to decrease and the value of the firm continues to increase until some point where the increase in K_e exactly offsets the benefits of debt financing. At this point it is said that the firm's cost of capital K is at minimum and its value is optimal. Thus

> "The traditional position implies that the cost of capital is not independent of the capital structure of the firm and that there is an optimal capital structure. At that optimal structure, the marginal real cost of debt is the same as the marginal real cost of equity.

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[27]James C. Van Horne, pp. 207-211; Ezra Solomon, pp. 92-98.

[28]W. D. Knight, and E. H. Weinwurm, Managerial Budgeting, (The Planning Executives Institute, Oxford, Ohio, 1968), p. 401.

> For degrees of leverage before that point, the marginal real cost of debt is less than that of equity; beyond that point, the marginal cost of debt exceeds that of equity."[29]

(2) The Modigliani-Miller (MM) approach[30] is based on other propositions besides the assumption of a perfect capital market. The MM approach stresses that cost of capital K is constant throughout all degrees of leverage. Thus, the firm can't decrease its K by changing its capital structure and in turn it can't increase its value. M & M contend that a capital structure is as suitable as any other. Assuming that two firms are identical in every respect except in their capital structure, they can't command different values. Otherwise, arbitrage will prevent their stock from being sold at different prices in the same market. With the relaxation of the assumption of no corporate income tax, M & M realize that the cost of capital can be decreased continuously with increasing leverage. Accordingly, M & M contend that in order to accomplish an optimal capital structure (i.e., lowest possible K and maximum value) the firm should use the maximum possible leverage. This contradicts the traditional approach, which asserts that extreme leverage will increase K and lower the value of the firm.

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[29]James C. Van Horne, pp. 209-211; Ezra Solomon, pp. 99-104.

[30]Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, XVIII, 261-97; Modigliani and Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investments: A Reply," American Economic Review, XLIX, 655-69.

Empirical research is generally in support of the traditional approach and refutes MM's empirical evidence. Weston found that K declines with increasing leverage.[31] Brigham and Gordon found that K_e increases with higher leverage.[32] Barges discovered a U-shaped relationship between K and various degrees of leverage.[33] Other studies, by Malkiel and Cragg, Power and Power, Wippern, Beranek, Arditti and Gordon, infer that judicious use of leverage lowers K cost of capital and is required to achieve the firm's operating objective.[34] Van Horne had indicated that in practice, the majority of academicians and financial managers favor the traditional approach because of the imperfections of the capital market that hamper the arbitage process of the M & M approach. Accordingly, this dissertation concludes that:

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[31]J. Fred Weston, "A Test of Cost of Capital Proposition," Southern Economic Journal, (October, 1963), XXX, pp. 102-12.

[32]Eugene F. Brigham and Myron J. Gordon, "Leverage, Dividend Policy and the Cost of Capital," Journal of Finance, XXIII (March, 1968), 85-103.

[33]Alexander Barges, The Effect of Capital Structure on the Cost of Capital, (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1963).

[34]Burton G. Malkiel and John G. Cragg, "Expectations and the Structure of Share Price," American Economic Review (September, 1970), LX, 601-17; R. S. Power and D. H. Power, "Risk and the Valuation of Common Stock," Journal of Political Economy (May-June, 1969), LXXVII, 349-62; R. F. Wippern, "Financial Structure and the Value of the Firm," Journal of Finance (December, 1966), XXI, 615-34; Myron J. Gordon, The Investment, Financing and Valuation of the Corporation (Homewood, Illinois: Richard D. Irwin, Inc., 1962); F. D. Arditti, "Risk and the Return on Equity," Journal of Finance, (March, 1956), XI, pp. 29-41.

generalization #18: The capital structure of the firm does matter in that it can affect the firm's cost of capital K. Accordingly, it can affect the achievement of the firm's operating objective. Appropriate accounting for the firm's capital structure and related policies should in turn, ease the prediction and evaluation of the firm's expected return/risk characteristics.

Dividends Decisions in Relation to the Firm's Operating Objective

It was indicated previously that the generally accepted valuation model for a business enterprise depends on the capitalization of the expected stream of dividends. However, whether dividends policy and decisions can affect the value of the firm is an important question the answer to which should affect financial decision-making and accordingly, should affect accounting measurement and communication of information. Therefore, this section is devoted to find an answer to this question by examining the research on this subject.

There has been much debate as to whether the dividend policy is relevant because it affects the value of the firm. In this regard, two opposing groups of writers can be recognized.

a) Those who argue for the irrelevance of dividends: Walter has indicated that dividends are irrelevant decision variables and should be dealt with strictly as financing decisions.[35] That is,

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[35]J. E. Walter, "Dividend Policies and Common Stock Prices," Journal of Finance. (March, 1965), pp. 29-41.

the payment of dividends is a passive residual and should be dependent on the availability of profitable investment opportunities. M & M argue for the irrelevance of dividends because the value of the firm is independent of its dividends decisions. That is, the increase in stockholder's wealth resulting from dividends received will be exactly offset by the decline in the value of their stock resulting from using alternative sources of financing, i.e., dilution from issuance of new stock. Based on some assumptions, M & M argue that two firms identical in all respects except in their dividends payout ratio should command the same value; otherwise, arbitrage by investors will bring their values to equality.[36]

b) Those who argue for the relevance of dividends: Lintner argues that dividends are relevant except in the case of fully idealized uncertainty.[37] Gordon argues that payment of dividends resolves uncertainty in the minds of risk-averse investors.[38] Gordon's dividends valuation model which was discussed previously may imply that the market values income from dividends above income

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[36]M. H. Miller and F. Modigliani, "Dividend, Policy, Growth and the Valuation of Shares," Journal of Business (October, 1961), XXXIV.

[37]J. Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations," Review of Economics and Statistics (August, 1962) 243-69.

[38]M. J. Gordon, "Optimal Investment and Financing Policy," Journal of Finance, (May, 1967), XVIII.

from capital gains because dividends are easier to predict. Thus risk increases with time and if the firm reduces its near future dividends to finance new investments with the hope of greater dividends in the distant future, investors may lower (penalize) the firm's stock by increasing K_e. Therefore, retention of earnings may become a more expensive source of financing. Also, investors may prefer obtaining income from dividends as opposed to selling a portion of their stock because of transaction costs, fluctuation of stock prices, and other inconveniences. On the other hand, the price of the stock may decline as the firm sells additional shares to replace retained earnings financing. Thus, the firm will have to sell more stock at a price lower than it would be if the stock price remained the same. Hence, such dilution effect may suggest a preference for retention of earnings. Moreover, Solomon has indicated that payment of dividends may have a favorable information content as to the firm's ability to generate cash.[39] Accordingly, dividends policy may affect the stock price of the firm. Elton and Gruber found that investors in high income tax brackets show a preference for capital gains because of its lower income tax.[40]

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[39] Ezra Solomon, p. 142.

[40] E. J. Elton and M. J. Gruber, "Marginal Stockholder Tax Rates and the Clientele Effect," Review of Economics and Statistics, February, 1970, LII, pp. 68-74.

Finally, flotation costs cause the firm to get less money from common stock financing. Consequently, the firm may favor retention of earnings for financing its projects.

Therefore, dividends policy seems to be in general, a relevant decision variable that can affect the realization of the firm's operating objective. Accordingly, management should seek an optimal dividends policy consistent with maximizing the value of the firm to its stockholders. Van Horne has indicated that:

> "The optimal dividend payout should be determined in keeping with the firm's investment opportunities and any preference that investors have for dividends as opposed to capital gains. Insight into such preference can best be gained through an empirical study of the relationship between share price and dividend payout for a sample of similar companies."[41]

Accordingly, management should determine the net preference for current dividends. Factors that increase net preference for dividends are: a) transaction costs, b) preference for current income, and c) resolution of uncertainty. The factor that decreases this preference is the tax disadvantage of dividends or preference for capital gains. Management should then balance such net preference against the inconveniences of common stock financing, namely the effects of flotation costs and underpricing. Accordingly, this dissertation concludes that:

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[41]James C. Van Horne, p. 257.

generalization #19: The dividends policy of the firm is generally relevant in that it can affect the investor's view of the firm's expected return/risk characteristics. Thus, consistent with generalization #17, appropriate accounting for the firm's dividends decisions and related policies is needed.

The Firm's Financial Decisions and Investors Decisions Combined

Valuation of the firm is a central problem facing both current and prospective investors in the firm's securities as well as the management who carries the burden of achieving the operating objective of maximizing the firm's value to its stockholders. Investors' perception of the firm's expected return/risk characteristics is what determines the value of its stock. Thus managerial financial decision can't be made in isolation from such investors perception. However, managerial actions and the related security markets' reactions should affect accounting measurement and communication of financial information regarding the overall performance of the firm. Therefore, this section is an attempt to delineate and integrate further the relationship between management decisions and investors decisions. Within this context, an attempt will be made to inter-relate the mathematical building of both the general valuation model of the firm (which was discussed earlier in this chapter) and the expected return/risk analysis pertaining to individuals decisions under uncertainty (which was discussed in the previous chapter).

Throughout this work, a theoretical attempt is to be made to emphasize the use of some general rule of measuring risk by regressing the firm's returns against some market return index. This is to be done by incorporating such a risk measurement (in the form of a risk premium to be added to the discount rate) directly into the general valuation model.

In Chapter II it was indicated that the value of a share of stock is a function of the expected return and risk, where an asset's risk may be measured by its marginal contribution to the total risk of the related portfolio or by its systematic risk in relation to some market return index. Accordingly, the value of a share of stock v_s, can be represented as

$$V_s = f[E(r_s),\sigma_s] \qquad \ldots\ldots\ldots\ldots (3.11)$$

It was indicated in this chapter that the firm's risk/return characteristics are the reflection of its major financial decisions of investment, financing, and dividends. Thus, the value of the firm's stock is a function of its major financial decisions or it is a function of risk/return characteristics resulting from these decisions. Accordingly, the environmental model of evaluating a firm's stock may be expressed as

$$V_s = f[E(r_s),\sigma_s] = f(I,F,D) \qquad \ldots\ldots\ldots\ldots (3.12)$$

Where I, F, and D represent investment, financing, and dividends decisions of the firm as they are conceived by investors in the security markets. Also it was indicated in this Chapter that estimation of the cost of equity calital (discounting rate) K_e should be made along the same line as the perception of investors at

the margin of the firm's risk/return characteristics. Accordingly, K_e should include a risk premium consistent with these characteristics. Therefore, the cost of equity capital K_e or the risk premium in particular, is the dynamic connecting link between decisions of management and decisions of investors that directly affect the value of the firm. By using equation (2.3) the expected rate of return from a share of common stock i over a period of time can be represented by:

$$E(r_i) = \frac{d + (E(V_i) - V_i)}{V_i} \qquad \ldots\ldots\ldots\ldots (3.13)$$

That is, $E(r_i)$ is obtained by dividing the amount of expected income (expected dividends and capital gains) by the current purchase price per share of stock. Expected capital gains is the difference between the expected terminal value $E(V_i)$ and the purchase price V_i per share. But we know from equation 2.34 that the expected rate of return $E(r_i)$ can also be represented by:

$$E(r_i) = r + \left(\frac{E(r_m) - r}{\sigma r_m}\right)\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right) \qquad \ldots\ldots\ldots\ldots (3.14)$$

We also know that $(E(r_m) - r)/\sigma r_m$ is equal to the slope of the SML. Thus equations 3.14 becomes:

$$E(r_i) = r + s\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right) \qquad \ldots\ldots\ldots\ldots (3.15)$$

Equating equations 3.13 and 3.15 produces:

$$\frac{d + (E(V_i) - V_i)}{V_i} = r + s\left(\frac{\partial qr_i}{\partial \sigma r_m}\right)$$

Accordingly, $\frac{d + E(V_i)}{V_i} - \frac{V_i}{V_i} = r + s\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right)$

$$\frac{d + E(V_i)}{V_i} = 1 + r + s\left(\frac{\partial \sigma r_i}{\sigma r_m}\right)$$

$$V_i\left(1 + r + s\frac{\partial \sigma r_i}{\partial \sigma r_m}\right) = d + E(V_i)$$

The current purchase or market price per share of stock V_i is obtained by:

$$V_i = \frac{d + E(V_i)}{1 + r + s\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right)} \qquad \ldots\ldots\ldots\ldots (3.16)$$

Equation 3.16 indicates that the current price of a share of stock to be sold at the end of one period t is equal to its expected cash inflows (dividends plus terminal value) discounted at an appropriate discount rate $\left(r+s\frac{d\sigma r_i}{d\sigma r_m}\right)$ for its risk class. The discount rate is essentially the cost of equity capital K_e where

$$K_e = r + s\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right) \qquad \ldots\ldots\ldots\ldots (3.17)$$

Thus, K_e consists of r riskless rate of return and a risk premium $S\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right)$ proportional to the security's risk. The slope S of SML

is the proportionality factor and $\frac{\partial \sigma r_i}{\partial \sigma r_m}$ is the beta coefficient or the appropriate risk index. Note that this leads to the same conclusions of equations 3.5 and 3.7 where the risk premium M is the same as in equation 3.17, that is,

$$M = \left(\frac{E(r_m) - r}{\sigma r_m}\right)\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right) = s\left(\frac{\partial \sigma r_i}{\partial \sigma r_m}\right)$$

Moreover, in the long run the terminal value $E(V_i)$ of a share of stock can be looked at as liquidation dividends (part of d_t), or it may even be ignored for if this value is discounted over the distant future ($t \to \infty$), it would approach zero. Accordingly, in the long run, equation 3.16 and Gordon's dividends valuation model are adaptable to each other. Thus, the current value of a share of stock, i, expected to offer dividends income over $t \to \infty$ periods of time, can be represented by

$$V_i + \sum_{t=i}^{\infty} \frac{d_t}{\left(1 + r + s\,\frac{\partial \sigma r_i}{\partial \sigma r_m}\right)^t} \qquad \ldots\ldots\ldots\ldots (3.18)$$

Thus this dissertation concludes that Gordon's model is essentially valid relationship between decisions of the firm and decisions of investors.

On the other hand, the value of the firm V_f is the sum of the values of its individual n number of shares where the expected income

to be discounted is the total periodic dividends of the firm $D_t = n(d_t)$, and the risk premium is the same and can be measured by the proportionality factor S and the systematic risk indices $\frac{\partial \sigma r_f}{\partial \sigma r_m}$ associated with D_t in relation to the same market return index r_m. Thus

$$V_f = \sum_{t-1}^{\infty} \frac{D_t}{\left(1 + r + s\frac{\partial \sigma r_f}{\partial \sigma r_m}\right)^t} \qquad \ldots\ldots\ldots\ldots (3.19)$$

So the components of the denominator in equation 3.18 and 3.19 are by and large the most important outcomes of dealing in the security market that need to be known and evaluated by investors and management in order to make adequate decisions. That is, given the firm's decisions of investment, financing, and dividends, the market will determine the current price or present value $1/(1+r)$ per unit of expected return free of risk, and the current price or present value $1/[1 + r + s\ (\partial \sigma r_i/\partial \sigma r_m)]$ per unit of expected return associated with some degree of risk. The difference between these two prices is the price of incremental risk premium $1/[1 + s\ (\partial \sigma r_i/$

$\partial\sigma r_m)]$ per unit of expected risky return.[42] Accordingly, this dissertation concludes that:

> generalization #20: The value of the firm is a function of the quality of its overall expected return/risk characteristics, which in turn is a function of the investor's perception and appreciation of the firm's decisions of investment, financing, and dividends. That is, $V_f = f[E(r_f),\sigma_f] = f\ (I,F,D)$. Therefore, the value of the firm depends also on the quality of communication between the firm and the security market. Expected return, risk, and intrinsic value are the end summary parameters which are central to this communication because they are the main valuation parameters used by both management and investors. Therefore, the same accounting information pertaining to these major parameters are needed by both sides.

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[42]The risk-adjusted discount rate method of capital budgeting is a derivation of the above model of financial decision analysis. Some writers, however, prefer to use the certainty equivalent method of capital budgeting by which they compensate for risk in the numerator as opposed to risk-adjusted discount rate method which adjusts for risk in the denominator. Nevertheless, the important fact common to both methods is that if risk does exist, then a prudent decision-maker should take it into his consideration. For detailed discussion and comparison of these two methods see: Houng-Yhi Chen, "Valuation Under Uncertainty," Journal of Financial and Quantitative Analysis, (September, 1967), II, 313-25; A. A. Robichek and S. C. Myers, Optimal Financing Decisions (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965), pp. 79-83.

Accordingly, the neutrality of this information is required to enhance the quality of communication and to improve valuation of the firm and the related decision-making in the capital market.

Thus far, the reader should know that the realization of the firm's operating objective is dependent on the quality of its expected return/risk characteristics which in turn is dependent on the implicit perception and appreciation by investors of the firm's financial decisions. That is, while investors are explicitly evaluating the firm's expected return/risk characteristics for their decisions, they are implicitly evaluating the firm's decisions. Accordingly, the previous models provide management with valuable tools to examine and optimize the firm's decisions in relation to its operating objective in a manner consistent with this implicit attitude of the investors. Equations 3.14 and 3.19 can be adopted to the evaluation of expected return/business risk characteristics of each activity or production decision in relation to the overall objective of the firm. Assuming the firm has a_j activities, $j = 1, 2, \ldots n$, then (based on equation 3.14) the expected rate of return from activity a_1 can be represented by:

$$E(r_{a1}) = r + s \left(\frac{\partial \sigma r_{a1}}{\partial \sigma r_m}\right) \qquad \ldots\ldots\ldots\ldots (3.20)$$

By using equation 2.3 $E(r_{al})$ can also be expressed as a ratio of the expected net cash inflows $E(R_{al})$ or income over the present value V_{al} of the resources committed to this activity.

$$E(r_{al}) = \frac{E(R_{al}) - V_{al}}{V_{al}} \qquad \ldots\ldots\ldots\ldots (3.21)$$

Equating equations 3.20 and 3.21 we find that the present value of activity a_1 is fairly approximated by

$$V_{al} = \frac{E(R_{al})}{1 + r + s \frac{\partial \sigma r_{al}}{\partial \sigma r_m}}$$

Assuming that the expected income $E(R_{al})$ is to be obtained over t periods of time, $t = 1 \to \infty$, then the present value of this activity becomes:

$$V_{al} = \sum_{t=1}^{\infty} \frac{E(R_{al})t}{(1 + r + s \frac{\partial \sigma_{al}}{\partial \sigma r_m})^t} \qquad \ldots\ldots\ldots\ldots (3.22)$$

Accordingly, the current value of the firm V_f can be expressed as the sum of the present values of its separate activities, aj, that is

$$V_f = \sum_{j=1}^{n} V_{aj} \qquad \ldots\ldots\ldots\ldots (3.23)$$

By substitution of 3.23 for 3.22

$$V_f = \sum_{j=1}^{n} \sum_{t=1}^{\infty} \frac{E(R_{aj})_t}{(1 + r + s \frac{\partial \sigma r_{aj}}{\partial \sigma r_m})^t} \quad \ldots\ldots\ldots (3.24)$$

The expected income of the firm at any period t is the sum of income from all its activities in that period, that is,

$$E(R_f)_t = \sum_{j=1}^{n} E(R_{aj})_t \quad \ldots\ldots\ldots (3.25)$$

Also, the risk associated with the firm's expected income is essentially the weighted average of the systematic risk of incomes from its individual activities, that is

$$\frac{\partial \sigma r_f}{\partial \sigma r_m} = \frac{\partial \sigma (w_j r_{aj})}{\partial \sigma r_m} \quad \ldots\ldots\ldots (3.26)$$

Where w_j is the proportion of total income of the firm that is accounted for by activity a_j, $j = 1,\ldots n$. Therefore by substitution of equations 3.25 and 3.26 for equation 3.24, the value of the firm is represented by:

$$V_f = \sum_{t=1}^{\infty} \frac{E(R_f)_t}{(1 + r + s \frac{\partial \sigma r_f}{\partial \sigma r_m})t} \quad \ldots\ldots\ldots (3.27)$$

Going from equation 3.22 to equation 3.27 indicates that the explicit value of the firm is the sum of the implicit values of its separate activities. Investors can't give explicit values to these separate activities because they can't deal directly with them. Therefore, the important conclusion is that the management should evaluate the separate activities of the firm as if investors can trade directly in them. Equations 3.19, 3.24, 3.27 and Gordon's valuation model are essentially valid relationships between decisions of the firm and decisions of investors. Accordingly, this dissertation concludes that:

> generalization #21: The explicit value of the firm's stock is the sum of the implicit values of its separate activities. Investors can not give an explicit value to these separate activities because they can't deal directly in them. However, while investors are explicitly evaluating the firm's expected return/risk characteristics for their decisions, they are implicitly evaluating the firm's decisions. Therefore, the important conclusion is that the management should evaluate the separate activities of the firm as if investors could trade directly in these activities.

Indeed, there is nothing strange in this conclusion since the value of the firm is a value derived from the expected return/risk characteristics of its economic activities. The equality of equations 3.19, 3.24 and 3.27 can not hold true unless: 1) the total value of the firm's stock is equal to the sum of the values of its individual

activities, and 2) the total risk associated with the firm's return is equal to the total weighted average risk associated with the returns on its separate activities. Finally, note that equation 3.27 is essentially the intrinsic value model used by fundamental security analysts to evaluate a firm's common stock, where in such a model the firm's normalized earnings are capitalized by using the adequate earnings multiplier - the reciprocal of the appropriate discount rate. Also, equation 3.27 is consistent with Gordon's dividends valuation model, since in the distant future the earnings of the firm will be paid off either as regular or liquidating dividends. Francis has indicated that capitalization of both earnings and dividends may be used simultaneously. If this is adequately done the resulting valuation figures can be used to check each other's accuracy.[43]

Moreover, risk or variability of return from a share of stock, a single activity, or from the firm as a whole has been approximated in equation 3.19, 3.24 and 3.27 by the systematic risk (or covariance) measured in relation to some market return index. Also, it was indicated in generalization #11 that the importance of the covariance concept in measuring an asset's risk holds regardless of whether the asset's return is analyzed within a portfolio context or in relation to some market return index. When properly calculated the systematic risk imposed by market conditions is a good estimate of the asset's risk calculated in a more difficult method within a portfolio context.

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[43]Jack Clark Francis, p. 317.

Moreover, the above equations show that measurement of an asset's risk in relation to some market return index rending the valuation model in a form more amenable to the mathematical formulation most suitable to the particular circumstances. Accordingly, this dissertation concludes that:

> generalization #22: The measurement of risk of an asset (a share of stock), an activity, or the firm as a whole therefore can be approximated by the systematic risk measured in relation to some market return index r_m, such as: Dow Jones Average, Standard and Poor's Average, and NYSE index. Much accounting information about a firm's risk can be added or improved by measuring it in relation to one of these indices to be agreed upon or of their weighted average. In the past, many data have not been classified as accounting information because of the profession's fear of not being able to determine their absolute truth or because they have no useful absolute truth of their own. However, many data can be classified as important accounting information because, when they are measured in relation to some common standard, they command relative truth of great significance in decision-making.

CHAPTER IV

BASIC INTEGRATED SOLUTION

Basic concepts of the integrated theory - Orientation:

It has been stated that this dissertation is mainly concerned with developing an integrated normative accounting theory applicable to private business enterprises including the petroleum industry. An adequate and clear definition of a normative set of accounting concepts is essential for this purpose because such concepts are required to describe what the accountant should measure and report in relation to the needs of information users. Many differences of opinion over the selection of accounting methods and procedures are the result of the failure to consider the intended uses for data to be reported and to define concepts relevant to these uses.[1]

The preliminary discussion in Chapter I, concerning the overall contemporary problems facing the formulation of an appropriate accounting theory, has resulted in generalization #1, which explicitly describes this dissertation's methodology of formulating its basic set of accounting concepts. Accordingly, these concepts must be derived directly from the environment of accounting itself. In

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[1]Walter B. McFarland, Concepts for Management Accounting, (National Association of Accountants, New York, August 1966) Second Printing, p. 5.

other words, the basic set of concepts should be derived from within those generalizations which were previously established to describe the environment of accounting.

The preliminary discussion has also resulted in the development of the neutrality concept of accounting measurement. The neutrality concept is re-produced here for convenience:

> neutrality of accounting measurement should be derived from the state of impartially relating the formulation and the application of accounting principles (propositions) to the most feasible description of the activities of the firm, as well as to those intended feasible uses of such description.

Therefore, while the neutrality of the measurer depends on his own personal attitude, the neutrality of the instruments or principles of accounting measurement is a concept to be considered by relating the formulation of these principles solely to the needs of the most feasible approaches of financial decision-making. Accordingly, adoption of the neutrality concept enhances the possibility of obtaining a normative accounting theory, since it focuses attention to the task of relating the formulation of accounting principles to the best possible description of the accounting environment. In this sense, both the normative approach and the neutrality concept are inseparable; they are two sides of the same coin.

Moreover, generalization #2 deals with the practical aspect of any proposed solution to the overall contemporary problem of developing an accounting theory. Accordingly, this dissertation concludes:

> The practicality concept of accounting measurement requires that any formulation of a normative accounting theory should preserve some degree of practicality in application.

Therefore, the practicality concept works as a constraint that keeps any theorization from becoming extreme and impractical. It was also indicated in Chapter I, that while this dissertation accepts the conventional going concern concept, it rejects the concept of conservatism in accounting.

Chapters II and III dealt with the investigation and description of the environment of accounting in relation to the investment/consumption decisions of individuals as well as various valuation concepts of a business enterprise. Accordingly, a major contention of these two chapters was that knowledge of expected return and risk from investment assets is vital for adequate financial decision-making, and that valuation of the firm should be based on its expected return/risk characteristics. Several generalizations were derived in relation to this contention. Generalizations 4 and 5 are definitional for they describe what may constitute the expected return and risk of an individual's holdings of investment

assets. On the other hand, generalizations 6 and 13 are instructional in this regard, for they clearly indicate that accounting measurement should give both of expected return and risk equal importance.

Taken together, generalization 4, 5, 6, and 13 suggest that expected return and risk are inseparable financial statistical parameters and are essential for decision-making. Because of their important informational attributes, these parameters are adopted in this dissertation as basic accounting concepts:

> Concepts of expected return and risk: expected return and risk are inseparable and essential statistics in financial decision-making under uncertainty, and accordingly, accounting measurement and communication of information should give them equal importance.

Generalization 7 indicates that financial decision-making presumes that the information being used expresses the economic significance of the activities of the firm or firms concerned. Different firms are more likely, however, to operate under different conditions. Accordingly, the conventional idea of uniform accounting is rejected. Instead, such uniformity should be narrowed down to cover enterprises with identical activities. Generalizations 7 and 8 emphasize the need for comparable accounting information, and for this reason, they promote the concept of measured economic significance as the basic ingredient of comparability. Generalization 8 goes further to indicate that the measured economic significance of the activities of individual accounting entities is the appropriate basis for facilitating understanding of the

relationships and differences between various entities, which is the essence and ultimate goal of comparability. Therefore, this dissertation concludes:

> The concept of a measured economic significance: for making financial decisions, the analysis and comparison of expected returns and risks of various securities presumes that these statistical parameters represent the economic significance of the business activities of related firms. In other words, such comparison is, in essence, being made between the economic significances of the activities of various firms concerned. Thus, accounting measurement should focus attention on the economic significance of these activities.

Generalization #9 indicates that although the expected returns and risks of various securities are merely estimates and have no absolute truth in themselves, when they are compared with each other, they do command a relative truth of great economic significance in decision-making. Obtaining a covariance parameter through comparison of returns of various securities or investment assets concerned is an example of such an important relative truth. Accordingly, this dissertation concludes:

> The relative truth concept of accounting measurement: Business analysis deal to a large extent with human behavior and conditions of uncertainty; therefore, truth may be measured and communicated only in relative terms.

Accordingly, accounting measurement can not be expected to provide information users with absolute truth. Even in the case of dealing with the past, such as the conventional measurement of income, accounting can not be expected to result in absolutely correct financial figures. However, the relativity concept is important because much accounting information can be added or improved by submitting their measurement to sume relative common standards, that is the relativity concept enchances the methods of measuring and representing the economic significance of a firm's activities.

Generalizations 10, 11, 12 and 21 are statements descriptive of how the measurement of risk may possess a greater importance in decision-making. Specifically, providing information about the systematic and unsystematic components of total risk adds to the quality and magnitude of the measured economic significance of accounting. Accordingly, this dissertation concludes:

> Systematic and unsystematic concepts of risk: the division of total risk into systematic and unsystematic portions eases diversification policies, determination of risk premium and ranking of various assets for investment analysis decisions. Calculation of the covariance of the firm's return with some market return index eases accounting measurement and communication of systematic risk.

Generalization #14 indicates that in order for accounting information to be relevant to its users, such information should be measured and communicated in terms of satisfying the needs of prudent financial decision-makers. Fundamental security analysis, Markowitz diversification of risk analysis and other generally accepted security valuation models are typical of the prudent uses of accounting information. On the other hand, emperical research concerning the efficiency of the security market strongly indicates that accounting information is useless to naive investors, technical analysts or chartists, dart throwers, and speculators. Accordingly, this dissertation concludes:

> Concept of prudent uses of accounting information:
> Accounting concepts and related principles and methods of measurement should be made consistent with the intended uses of prudent financial decision-makers.

Examination of accounting methods for consistency with the prudent use of financial data is theoretically likely to reduce excessive information and the alternatives for accounting measurement. Generalization #15 and 16 recommends that accounting should provide adequate information for evaluating the firm in terms of achieving the operating objective of maximizing its value to its stockholders. Accordingly, the said generalizations promotes valuation of the firm as an important concept that should be considered in accounting measurement. On the other hand, generalization #17 explains that

Gordon's dividends valuation model, or some version of it, is generally considered appropriate for the aforementioned valuation. Generalization #20 and 21 conclude further that the information pertaining to this valuation is needed by the investors in the firm's securities as well as the management, whose financial decisions affect directly the value of the firm. Accordingly this dissertation concludes:

> The concept of the firm's valuation: The value of the firm reflects the quality of the investors perception and appreciation of its financial policies and decisions. Accordingly, the accounting information pertaining to the valuation of the firm are needed by the current and prospective investors in the firm's securities as well as by the management of the firm. While the value of the stock depends on the quality of its expected return/risk characteristics, it also depends on the quality of information communication between the firm and the security market with respect to these characteristics.

Adequate information about the firm's expected return/risk characteristics is essential for an appropriate portfolio analysis, risk diversification decisions, common stock valuation (including interinsic value analysis) and major managerial financial decisions of investment, financing, and dividends. Moreover, generalizations #18 and 19 indicate that the firm's capital structure and dividend

decisions do matter in that these decisions can affect the value of the firm through their affect on the investors' perception of the expected return/risk characteristics of the firm's stock. Accordingly, this dissertation concludes:

> The concept of the relevancy of capital structure and dividends policies: Both of the firm's financing mix and dividends policies are relevant decision variables that can affect the value of the firm, as well as investors' decision-making.

Thus far, this dissertation has formulated its basic normative concepts which will underlie the development of the forthcoming integrated set of accounting propositions. The concepts of neutrality, practicality, and the going concern concept may be regarded as being general in nature, for they are concerned with the overall quality of formulating an integrated theory and the application of its proposed solution. Therefore, these concepts likewise apply to the applications of the other concepts themselves. On the other hand, prudent uses of accounting information, measured economic significance, relative truth, divisionality of total risk, common stock valuation, and the relevancy of capital structure and dividends policies, may be regarded as being specific in nature, for they are directly related to the description of the needs of information users. That is, these concepts

deal directly with the quality of the forthcoming accounting propositions as well as the related methods and procedures of measurement, and communication of financial information. The basic set of normative accounting concepts are listed for convenience as the following:

1) General concepts
    a) neutrality of accounting information
    b) practical accounting measurement
    c) going concern concept.
2) Specific concepts
    a) prudent use of accounting information
    b) measured economic significance
    c) relative truth
    d) expected return and risk
    e) divisionality of total risk
    f) common stock or the firm's valuation
    g) relevance of capital structure and dividends policies.

Basic Integrated Accounting Propositions (Principles):

In order to serve its environment efficiently, the accounting function must operate within the framework of easing and improving the economic decision-making by providing information users with adequate data. Therefore, a normative solution to the contemporary problems of accounting, including those in the petroleum industry, should be made consistent with an overall operating objective

of accounting that is properly defined in relation to its previously discussed environment. This is so, since the guidance and evaluation of these practices must be based on pre-formulated set of normative propositions or principles the normativity of which is to be derived from within an operating objective and the related concepts of accounting environment.[2] Therefore, the first theoretical construct in this section is to propose an operating objective of accounting for a business enterprise.

The operating objective of accounting - an ideal proposition:

The specific concepts above integrate further in that prediction of the future performance of the firm and, in particular, the determination of the expected return/risk characteristics of the firm

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[2]Limited attention has been given to the establishment and definition of a clear objective to be served by accounting. Accordingly, several writers have presented criticisms along the line of the following one:

> "I have searched accounting literature and have talked to persons well-informed on this subject, and cannot find any place (1) a clear statement of the purposes and objectives of accounting, (2) a statement of the basic standards (whether they are called postulates, concepts or something else) that reflect the purposes and objectives, or (3) a testing of existing principles and practices against such standards. Many well informed lawyers, bankers, and other businessmen find it difficult to comprehend the fact that this has never been done by the accounting profession."

"A New Approach to Creative and Constructive Accounting Research is Needed," George R. Catlett, Arther Andersen Chronicle, October 1961, p. 463.

as a whole and/or as a separate activities, is the major common problem encountering adequate financial decision-making. Therefore, an operating objective of accounting may be ideally proposed and defined as follows:

> (P.1) Accounting is the measurement and communication of the firm's expected rate of return/expected risk parameters and the related supporting schedules required for the evaluation of the firm as a whole and as separate activities in relation to the operating objective of maximizing its value to its stockholders.

Accordingly, this proposition explicitly requires that the firm's financial policies and related capital budgeting plans be used in the measurement and communication of the firm's expected return and variability of return, as well as the related supporting schedules.

The concept of the firm's valuation and related explanatory generalizations indicate that:

$$V_f = f\,[E(r_f), \sigma r_f] = f\,(I, F, D,) \qquad \ldots\ldots\ldots\ldots (5.1)$$

Where the value of the firm is a function of the quality of its overall expected rate of return/risk characteristics, which in turn is a function of investors' perception and appreciation of the firm's major decisions of investment, financing, and dividends. Equivalently the quality of information Φ about the value of the

firm is a function of the quality of information about the firm's expected rate of return/risk characteristics. In notation form this can be expressed as:

$$\Phi(V_f) = f \quad \Phi\,[E(r_f),\sigma r_f] \qquad \ldots\ldots\ldots\ldots (5.2)$$

Moreover, the firm's expected revenues $E(R_f)$ and expected costs $E(C_f)$ are logically the independent variables that determine the firm's expected rate of return $E(r_f)$ as a dependent variable. Also, the variability of these expected revenues and costs is the determinant of the risk or the variability of the firm's returns. Therefore, the quality of information about the value of the firm is a function of the quality of information about the firm's expected revenues and expected costs as well as the variability of these revenues and costs. Accordingly, in notation form equation 5.2 becomes:

$$\Phi\,(V_f) = f[[\Phi\,[E(R_f),\ E(C_f)] + \Phi\,[\sigma\ E(R_f),\sigma E(C_f)]] \ldots (5.3)$$

Thus, equation 5.3, which is the direct result of the application of the firm's valuation concept, clearly indicates that an adequate measurement of the firm's expected return/risk characteristics should be based directly on the measurement of the firm's expected revenue and cost functions.

Also, the concept of a "measured economic significance" is related directly to the measured economic significance of the firm's expected revenues and costs. Accordingly, this dissertation concludes

the following proposition consistent with the above idealistic operating objective of accounting, which is said to emphasize the measurement of the firm's expected return/risk parameters:

> (P.2) The primary basis of accounting for the firm's expected return and associated risk is the calculation and estimation of the expected revenues and costs as they are related to the firm's financial policies and decisions.

Therefore, the other concepts of relative truth of accounting measurement, divisionality of total risk, and the relevancy of capital structure and dividends policy, applies equally well to the development of such a proposition and related methods and procedures of accounting measurement.* However, insofar the measurement of balance sheet items is concerned, this dissertation realizes that these items should be measured in relation to their effect on the economic significance of the firm's expected revenues and costs and on the variability of these revenues and costs. That is, the measurement of the balance sheet items is a passive residual in relation to the valuation of a going concern in terms of accomplishing the operating objective of maximizing its value to its stockholders.

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*Further discussion of the application of these concepts to the development of specific methods and procedures of accounting measurement is considered beyond the immediate purpose and time limitation of this dissertation.

Therefore, this dissertation concludes the following proposition concerning the measurement of balance sheet items under the said idealistic accounting operating objective.

> (P.3) Balance sheet items are passive residuals in relation to the valuation of the firm and their measurement is relevant only to the extent that they affect the measured economic significance of the firm's expected revenues and costs as well as the variability of these revenues and costs.

Accordingly, this proposition completely rejects Chambers' proposal of "current cash equivalent" as a basis of accounting measurement.[3] There is much more that can be said about Chambers' proposal, that is beyond the immediate purpose of this dissertation.

Furthermore, the said idealistic operating objective of accounting function is essentially in line with the general accounting concepts of neutrality, prudent use of information and the going concern concept. First, the formulation of the operating objective proposition is fairly neutral and free of prepossession because it is based on a prior unbiased description and investigation of what the environment of accounting would require to be measured and reported. Also, the resulting data from the application of such proposition seem to be consistent with the needs of prudent information users as well as consistent with the assumption that the business enterprise is to continue its activities in the future.

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[3]Raymond J. Chambers, Accounting Evaluation and Economic Behavor (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1966), p. 92.

However, as the concept of practicality is introduced, this dissertation concludes that the proposed operating objective is an ideal one and does not seem to be practically applicable (at least in the near future) for the following reasons:

(1) In order to perform these accounting measurements, accountants are required to be more educated and experienced with the workings of some basic quantitative methods and some concepts in other business sciences. However, the accounting profession should lend itself toward making these practices an ultimate objective of its function in the future. This would entail:

a) the incorporation of quantitative valuation techniques into the accounting education curriculum.

b) the encouragement of accounting research along this line of study in order to improve contemporary valuation methods and to solve several statistical inference problems which may arise (now and then, depending on the circumstances) in relation to the application of regression analyses, linear programming, etc. Multicolinearity and intercorrelation problems are outstanding in this respect.

c) the planning of a reasonable transitory period within which this change in accounting measurement is to take place.

(2) Management is expected to resist such a change on the grounds that it will harm its competitive position through exposing the firm's financial policies and related capital budgeting decisions. However, when the neutrality of the attitude of the accountants and their measurement techniques becomes generally accepted and respected as a professional discipline the proposed accounting practice becomes a relatively fair game to all managements. However, the application of this practice does not have to expose managerial policies and decisions in a manner that weakens the firm's competitive position.

(3) Some regulatory bodies such as the SEC and the IRS are also expected to resist the proposed operating objective of accounting. This problem is not likely to be solved unless public pressure and some higher authority combine to make the said practice work.

Therefore, this idealistic accounting practice should be reduced over a temporary planning period of accounting reform, to some practical level. Accordingly, the remaining part of this chapter is dedicated to the investigation of the possibility of withdrawing to a less idealistic, but more practical operating objective of accounting function.

The operating objective of accounting - a more practical approach:

In order to formulate a normative, and yet a practical, operating objective of accounting for a business enterprise, this objective should do away with the involvement of accounting function in a direct measurement and communication of the firm's expected return/risk characteristics and a direct use of the firm's financial plans for this purpose. The abandonment of the idealistic objective should not, however, preclude the fact that decision makers still need adequate information for the evaluation of the firm's performance in terms of its expected return/risk characteristics. Consequently, such information should be somehow obtained. In so far as reporting to outside users is concerned, the abandonment of the idealistic approach leaves financial accounting to deal only with the measurement and communication of the past performance of the firm. Consequently, the resulting accounting information can not be expected to be directly incorporated (as opposed to the expected return/risk parameters which would otherwise be provided by the idealistic approach) into a user's decision making. That is, accounting measurement and communication of information which emphasizes the past performance of the firm has only a historical value to decision-making under conditions of uncertainty, where the value of such information essentially depends on its appropriateness to the users as well as on the ability of these users in applying it for predicting

the firm's expected return/risk characteristics. Accordingly, the produced accounting information commands an economic significance only so far as it can make prediction of the firm's future performance possible and adequate for financial decisions-making. Therefore, the specific concepts of this theory are integrated, leading to the conclusion that all data concerning the firm's past transactions and events that should affect the prediction of the firm's expected return and risk parameters has an economic significance, and accordingly, should be measured and classified as accounting information.

The next question becomes, what data should affect the prediction of the said decision parameters in order to become subject to accounting measurement. The concept of "prudent uses of information" suggests that accounting data should be produced and reported consistent with the intended uses of prudent financial decision-makers. The emperical research concerning the efficiency of security markets indicates that investors, other than professional fundamental security analysts, are responsible for the aimless and hopeless fluctuation of security prices. Their decisions are aimless and hopeless because they, simply, could earn the same rate of return by randomly selecting their investment portfolios without causing trouble to the economy. Many kinds of historical accounting information made publicly available were proven to be irrelevant in benefiting them. On the other hand, prudent financial analysts are the only ones getting credit for making efficient and profitable investment decisions as well as for

correcting security market fluctuations and thus, are capable of inproving the performance of the economy as a whole. These prudent analysts are the only ones who are using accounting information (in spite of its several inadequacies) in a meaningful and feasible manner for making securities investment decisions. Therefore, in answering the above question, the concept of the prudent uses of accounting information suggests that the data needs of these prudent financial analysts should be used to characterize whether or not particular data would affect the prediction of the firm's expected return/risk characteristics. Consequently, the previous discussion introducing the concept of practicality, along with the effect of the application of the other basic concepts, allows this dissertation to conclude the following proposition of formulating a normative and yet a practical operating objective of accounting to outsiders.

> (P.4) Accounting is the neutral measurement and communication of all possible historical information bearing an economic significance to a prudent and a feasible evaluation of the firm (both as a whole and as separate activities) with respect to its operating objective of maximizing its value to its stockholders.

Therefore, accounting function should measure all the inside events and conditions that are capable of being measured in terms of their economic significance to a prudent evaluation of the firm. Then,

it should properly communicate the measured economic significance to information users. In carrying out this function, the accountants' attitude as well as their instruments of measurement should remain neutral.

Basic Propositions of the Practical Approach

A close adherence to the above operating objective requires, in turn; a clear answer to the question of what are the attributes that make a prudent financial analyst decide on a given piece of data as being needed in his work of evaluating the firm. Ideally, the answer to this question must be based on a thorough emperical research which is beyond the immediate purpose of this dissertation. However, the basic concepts, particularly the specific ones, which have been derived from the description of various evaluation models and the limitations of related basic data indicate that there are three major attributes that must exist in order to satisfy the needs of a prudent financial analyst. First, the data must concern the outcomes of business events and transactions that affect the accomplishment of the firm's operating objective. Accordingly, this dissertation makes the following quantative accounting proposition about the overall attributes of the quantity or volume of data needed by a prudent financial analyst; therefore such data should be included as accounting information:

(P.5) Past transactions, events and conditions whose extrapolation into the future will imply that they, or any of their kind in the future, are expected to affect the achievement of the operating objective of the firm and in turn its stockholders' wealth, when measured, should constitute a measured economic significance of interest to prudent financial analysts.

Therefore, these concepts integrate when considering that the outcomes of the business events and transactions have an important informational content; and that in order to command a measured economic significance usable by prudent analysts, the informational content of such outcomes must be extrapolatable into the future as well as that there must be an economically meaningful cause/effect relationship which will give rise to the occurence of these outcomes. That is, the extrapolatability of the business outcomes and the existence of a meaningful causal relationship in their occurence are two major interrelated, qualitative conditions that are pre-requisite to the consideration of any informational content (data) concerning these outcomes as having a measured economic significance in decision-making, and accordingly, to the inclusion of such content as an accounting information. Accordingly, the accounting measurement, under the previously defined practical operating objective, is essentially a cause/effect extrapolatory accounting. A cause/effect relationship may be defined as one involving a cause (i.e., and effort, cost or an asset) incurred

through a business transaction or activity to acquire an effect (i.e., an accomplishment, a service or another asset received). Consequently, this dissertation makes the following general qualitative proposition as to the basic character of a measured economic significance.

> (P.6) The primary basis of accounting is the measurement of the economic significance of the firm's efforts, or causes, and its accomplishments, or effects. In order to have this measurement command an economic significance for decision-making 1) causes and effects must be related to the achievement of the firm's operating objective; 2) causes and effects must be relatable to each other individually or in groups, directly or indirectly; and 3) the measurement of various causes and effects must be capable of timely extrapolation and usage.

This proposition describes the overall qualitative conditions of any measurable accounting information. The three conditions of this proposition are interrelated in describing the information needs of a prudent financial analyst and no one of them can, with the exclusion of the others, hold satisfactorily for this purpose. The feasible extrapolation and usage of any financial data essentially requires that this data be concerned with a constructive cause or effect and that these causes or effects belong to a meaningful economic relationship that is directly or indirectly identifiable with the achievement of the firm's operating objective. Thus, business events and related

information that cannot be, for any reason, extrapolated into the future in terms of their impact on the firm's expected return and risk characteristics is useless for the evaluation of the firm and the decision making it is based upon; and accordingly, it is not submittable to accounting measurement under this integrated theory. For example, information concerning business events that have no genuine cause, or whose cause has no effect on the realization of the firm's operating objective can not be said to belong to a meaningful economic relationship, and accordingly, its measurement should not fall within the domain of accounting function.

Thus far, this dissertation has developed, 1) a proposition concerning the definition of a practical operating objective of accounting, consistent with the findings in its environment; 2) a quantitative proposition as to what are the overall needs of information users; and 3) a qualitative proposition as to what is the overall quality of the information needed. Accordingly, it was said that such information must be the result of an economically meaningful causal relationship in terms of the firm's operating objective as well as that it must be capable of timely extrapolation and usage.

The general quantitative and qualitative propositions were derived from within the framework of the basic concepts of this integrated theory as well as being made consistent with the previously

defined practical operating objective of accounting. In order to be useful, information must be quantitatively and qualitatively sufficient in relation to the purpose of its usage. Therefore, the above two propositions are clearly made to insure the usefulness of the accounting measurement and the communication of financial information. Namely, these propositions are to insure that the processed information possesses an economic significance for financial decision-making.

However, in order to accomplish this purpose, these propositions explicitly call for the accounting function to emphasize the indentification of the various economic relationships (causes and related effects) resulting from the individual business transactions, events and conditions and then the measurement of these causation relationships in terms of their impact on the firm's return and risk characteristics, which in turn determine how far the firm has accomplished its operating objective. But, the measurement of the impact of these causation relationships on the firm's expected return and risk must be based on the physical economic attributes which arise from various business transactions and events comprising the firm's performance. A physical economic attribute is meant to infer that a certain business transaction or action has affected the outcome of a particular activity or group of activities and, accordingly, that they affect, or are expected to affect, the accomplishment of the overall

objective of the firm. Therefore, identification of these attributes calls for a close observance of the firm's performance such as physical things as to buying and selling of goods, nature and usage of labor, etc. Theoretically, except in the case of joint and common activities, the physical attributes are generally observable and directly identifiable. Business transactions and events may also have psychological impact on the performance of the firm's labor and management, and in turn, this affects the accomploshment of the firm's operating objective. Psychological attributes are, however, difficult to segregate, identify and measure as well as to predict and extrapolate into the future. Therefore, psychological attributes are not submittable surrogates for accounting measurement. Only, physical economic attributes are admissible surrogates for this purpose.

In turn, in order to emphasize the measurement of the economic significance of the firm's activities, the quantitative and qualitative proposition calls for the accounting to follow as closely as possible the physical economic attributes of the various causation relationships pertaining to these activities. That is, these attributes are the basis for identifying whether a cause has produced an effect on the achievement of the operating objective of the firm and how that effect has taken place. Several questions may be raised in connection with such identification and measurement propositions. However, some of the questions that this dissertation would like to delineate,

because of their immediate importance, include how close accounting measurement should pursue the physical economic attributes of various causation relationships? Are there any limits of these causation relationships? And what is the framework to be used in identifying, and measuring various causation relationships in terms of their attributes. These questions are interrelated, for they deal with the size of the business activities, as well as with the accounting and information systems being used. Accordingly, a simultaneous answer to these questions seems to be more convenient. The rest of this chapter is devoted to the discussion and the development of some specific integrated propositions regarding an answer to these questions and related problems. Formulation of these propositions should be made consistent with the operating objective of accounting, and should be derived from within the framework of the basic integrated concepts of this dissertation.

An adequate identification of various physical economic attributes requires the establishment of an appropriate information system. Neutrality should be maintained in selecting and designing such a system, so that the maximum possible number of cause/effect relationships, of each business activity or cost center, is identifiable and measurable in terms of the economic significance of their physical attributes, in relation to the achievement of the firm's operating objective. That is, the concept of neutral accounting does not only

apply to the formulation of principles which deal directly with accounting measurement, but it also applies equally well to the selection of the system within which such measurement is to take place. Accordingly, it is a direct application of the neutrality concept to propose that.

> (P.7) Methods and procedures of data gathering and processing should be neutral so that the identification, measurement and the extrapolation of various economic attributes pertaining to the causation relationships of the firm's activities are not precluded. Only outside environmental reasons (i.e., lack of data) and/or the nature of the business activities (i.e., joint activities) may preclude cause/effect relationships and their extrapolations.

Therefore, both the accountants' attitude and their instruments of measurement should be neutral in relation to the identification and measurement of the economic significance of various causation relationships. Theoretically, the number of these relationships depends on the size and nature of the firm's activities as well as depending on the kind and quality of the accounting system being used. For example, the more the firm's activities are jointly performed and the more common are the departmental services, the more difficult is the direct identification of the causation relationship and related physical economic attributes. Also, the more the accounting system

is coordinated with the information needs for control and planning purposes, the more likely is the number of identifiable individual causation relationships. Theoretically, the greater the total dollar magnitude of directly identifiable individual causation relationships, the more accurate are the figures shown in the financial statements that are made for outside information users. That is, the efforts and accomplishments of individual cost centers or activities cohere or re-assemble to produce the overall effort and accomplishment of the firm. For example, returns (revenues less costs) of individual activities, as well as the risk associated with these returns (variability of revenues and costs) are what determine and constitute the overall return/risk characteristic of the firm. Accordingly, one may look at the capital invested in the firm as an effort made on the part of the stockholders in order to accomplish or receive a stream of return in the form of dividends or capital gains on their stock investment. Such a causal or effort/accomplishment relationship may be regarded as the most encompassing and important relationship whose aggregate amount needs to be identifiable, predictable and as accurate as possible. Between the two extreme parts of such a relationship, a causal-extrapolatory accounting may consider the performance of the firm towards its operating objective as consisting of a series of policy/decision sub-relationships, decision/action sub-relationships, action/activity outcome sub-relationships, and activity outcome/stockholder wealth (or value

of the firm) sub-relationships. The first sub-relationship in the series is essentially directly related to the firm's policies, and related decisions for using the firm's capital. One may argue that such a sub-relationship can not be considered as consisting of an effort and accomplishment, for at this stage the firm's policies are not yet put into action or execution and have not yet resulted in an accomplishment. However, this dissertation realizes that every genuine managerial action, whether it involves a policy formulation or decision making, does constitute a causal relationship that, although its physical existence is currently found only on paper, it will have in the future physical economic attributes observable when the related business activities are actually taking place. Thus, such managerial policies and decisions may affect in advance the achievement of the firm's operating objective (maximization of its value) through their effect on the investors' perception and expectation of the firm's performance in the future. However, direct accounting measurement and communication of these plans and decisions for outside information users is said to be an ideal accounting function. It was theoretically suggested that such a function be abandoned because of the strong likelihood that it would be resisted by management and some other governmental agencies as well as being incompatible with some deficiencies within the accounting profession itself. Also, although it was stated that accounting, under the

practical operating objective, should avoid measurement and communication of this kind of sub-relationship for external reporting, it should not be understood, however, that the said function should ignore the measurement and communication of these plans and decisions for inside managerial uses.

On the other hand, the physical economic attributes of the last sub-relationship are directly related to the final outcome of how far the firm has accomplished some desired objectives in pursuing the overall operating objective of maximizing its value to its stockholders. These are the physical economic attributes that accounting under the practical objective should follow closely in measuring and communicating various histroical causation relationships of the firm's activities. The middle two sub-relationships represent some degree of positive or negative advance toward the firm's overall operating objective. Therefore, in order to be capable of adequate measurement of the economic significance of the firm's activities, through following closely the physical attributes of various related causations, the accounting function should develop an appropriate accounting system in order to ease the identification and measurement problems of these attributes. Accordingly, this dissertation makes the following proposition:

(P.8) The firm's performance should be divided into separate activities (i.e., according to major products or market segments) where each activity consists of a number of definitely related causal pairs in the said series of sub-relationships. Such division should be made consistent with the objective of (1) easing the identification of various causations and related physical economic attributes, and (2) making the extrapolation of these causations possible and meaningful. Accordingly, such division, whether it is upward towards larger size activities or downward towards smaller size activities, should be made consistent with the purpose of obtaining a direct identification of the largest possible dollar magnitude of these relationships.

Application of this proposition is essential in order to ease and minimize the arbitrary allocation of common costs (causes or efforts) and revenues (effects or accomplishments) which represent an obstacle in cause/effect extrapolatory accounting. Activities that effect each other may be considered under this proposition as constituting one causation relationship. Also, joint operations may be regarded, for this reason, as a single activity.

Previous discussion has emphasized the need for the identification and measurement of the economic significance of the firm's activities on the basis of the physical attributes of these activities in

relation to the achievement of the firm's operating objective. That is, the physical economic attributes of all business activities, including net income, should be measured and reported consistently with the information needs for evaluating the firm's performance towards the objective of maximizing its stockholders' wealth. Accordingly, causal extrapolatory accounting carries accounting measurement and communication of information further beyond the requirements of the traditional measurement of net income and other balance sheet items. Traditional financial statements do not show enough information to evaluate how far the firm has accomplished and is expected to accomplish, its operating objective. For example, such factors as the overall managerial intentions of earnings retentions vs. dividends payments, the effect of the changes in the assets' composition on the firm's business risk and the effect of the changes in the financing mix on the firm's financial risk are equally important in portraying the firm's accomplishments towards the said objective. The difference in accounting emphasis, between the conventional accounting measurement and this theory, is clearly due to the difference in emphasis as to what may constitute an appropriate operating objective of the firm and that of accounting. While there is no definite objective which has been said to be served by the conventional accounting practices, it seems that the accounting function has been emphasizing the maximization of profit as the appropriate operating

objective of the firm (this is also consistent with the view of the traditional business finance). In turn, measurement of the dollar magnitude of net income and EPS was traditionally emphasized in order to portray the firm's performance in relation to that objective. However, this integrated theory, with its prior acceptance of the maximization of stockholders wealth as the ultimate objective of the firm, does not consider net income (conventionally known as changes in net worth) as the only achievement that the firm should seek in order to realize that objective. While net income has important implications as to the firm's past and future dividends and financing policies, it is not the only major factor that the accounting function should seek to measure and report. For example, business risk, financial risk and growth factors are other decision variables of equal importance with net income in evaluating the firm.

Similarly, it was stated earlier in Chapter III that the net income, while it is conceptionally viewed by accountants as representing the change in the firm's net worth, is theoretically of a more important informational content in evaluating the firm than the knowledge that the firm's net worth is preserved. That is, in making their decisions, outside information users are by far more interested in knowing the changes in the net worth of a firm in relation to that of other firms, rather than in knowing whether the firm has maintained

a certain net worth. Extrapolation of these changes, good or bad, into the future, is what constitutes along with other factors an appropriate basis for decision-making. Both the profitability of the firm and the factors that cause its variability, effect the firm's dividends decisions and in general the firm's ability to maintain some level of wealth flowing to current and prospective suppliers of capital. Therefore, measurement and reporting of net income and the factors that cause its variability is directly related to the overall purpose of causal extrapolatory accounting which is to provide adequate information for evaluating the firm's performance in relation to its operating objective of maximizing its value to its stockholders.

Therefore, the next chapter is dedicated to the formulation of some specific propositions which will act as a guide to the accounting measurement of income as well as risk factors that cause its variability.

CHAPTER V

BASIC INTEGRATED SOLUTION OF THE PRACTICAL APPROACH CONTINUE- MEASUREMENT OF RETURN AND RISK

Based on the discussion of the previous chapter, causal extrapolatory accounting would regard net income as the difference between a group of firm's efforts (used assets and resources) and a related group of the firm's accomplishments (revenues or assets received) during a period of time. Accordingly, measurement of income should be based on the physical economic attributes of these two related groups of causations or efforts and accomplishments. However, these efforts and accomplishments are related to the acquisition and utilization of the firm's economic resources. That is, these causations are the product of a continuous process of inflow and outflow of economic values. Accordingly, asset measurement will be discussed first. Then, return and risk measurement will follow.

Asset Measurement:

Acquisition of an asset may be regarded as a single complete causal relationship where such acquisition involves a cause or an effort (i.e. a liability is assumed a service or an asset is given up to accomplish a desired effect which is the acquired asset). If

such an asset is to be used in a particular activity or cost center it must be identified accordingly so that the resulting causations of using that asset as well as related physical economic attributes can be identified with the said activity.

On the other hand, the usage of the acquired asset in the firm's operations to produce goods and services represents a new causal relationship. That is, such usage may be regarded as a new effort or a cause (cost or an expense) the occurance of which is intended to result in a new effect or accomplishment (i.e. acquired goods and services), consistent with the operating objective of the firm. Also, selling of goods and services represents another causation where goods are given up or services are performed in order to receive revenues or assets of greater value. Accordingly, net income arises from the excess of the value of the firm's accomplishments over the value of the related firm's efforts or used resources during a period of time. Therefore, net income is an economic attribute which can be derived from the physical economic attributes of the activities of the firm during the period of measurement. Accordingly, net income is an important attribute of the firm's performance towards its operating objective. On the other hand, payment of dividends out of the firm's net income as well as the risk or variability of maintaining some stream of income flowing to owners are in turn a causal relationship where the income to

be realized and the associated variability become the cause or the effort on the part of the firm in order to accomplish its overall objective of maximizing its stockholders' wealth. The last causal relationship arises from the usage of the capital and other economic resources provided and committed by these stockholders. Therefore, while dividends, capital gains from the sale of stock and a given degree of risk, can be viewed as the ultimate effect or accomplishments of the firm in relation to its operating objective, they are the outcome of a long series of causal relationships pertaining to the management of the firm's assets.* Accordingly, accounting measurement of the firm's assets and the utilization and management of these assets should be made consistent with the objective of providing information relevant to the evaluation of the current and expected ultimate accomplishments of the firm on behalf of it stockholders.

Therefore, accounting information should enable the users to evaluate the economic impact of the utilization of the firm's assets on its stockholders' wealth. In order to justify the accounting recognition of a given causal relationship of an asset acquisition as having a measured economic significance in decision making causal

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*A given degree of risk or variability of return is also considered as an accomplishment for it is an unavoidable outcome under conditions of uncertainty, and it affects stockholders' wealth.

extrapolatory accounting entails that such justification be based, in the first place, on meaningful physical economic attributes of the said acquisition relationship. Knowledge and identification of these attributes is needed to assure that (1) the causes (efforts) and the effects (accomplishments) pertaining to the asset acquisition are, individually or in groups, meaningful by being related to each other and (2) the causes and the effects of the asset acquisition should have an economic impact on the achievement of the firm's operating objective. Accordingly, these causes and their effects are genuine ones, and their informational content is relevant to the needs of decision makers. Therefore, this dissertation concludes the following proposition regarding the physical economic attributes needed to support the recognition of a particular causal relationship as an asset:

> (P.9) In order to recognize a business activity or a transaction as an asset (1) the activity must involve some effort, or cost, necessarily and legally incurred in order to acquire an intended asset, (2) the incurred efforts and costs are accumulated in relation to that intended asset, (3) such an asset is acquired or reasonably expected to be acquired through delivery, production or research, (4) the asset is expected to contribute to the

accomplishment of the firm's operating objective and (5) that items 1, 2, 3, and 4 above are not reversed until the time of financial reporting.

The first two attributes identify the cause (or the effort) and the next two attributes identify the resulting effect (or the accomplishment). On the other hand, the last attribute assures that at the time of financial reporting the past interpretations of the cause and its effect are still valid. Therefore, if the physical economic attributes support the existence of only the cause or only the effect, there is no meaningful and genuine causation relationship whose accounting measurement can constitute an economic significance as an asset. For example, if only the cause (costs) exists, and no feasible effect is incurred or can reasonably be expected to be incurred, the efforts or costs should be recognized as a loss. Thus, losses are causes or efforts expended without useful effects or accomplishments. On the other hand, if an asset (effect) is acquired, and no (cause) cost, effort or genuine liability is undertaken such an asset can not be feasibly expected to effect the operating objective of the firm and accordingly, should not be recognized. A cause for a donated asset can be at least identified by the acceptance of the firm and legal transfer of its ownership title.

Moreover, a close adherence to the attributes identified above is more likely to result in financial reporting that identifies the nature of the acquired asset and its effect on the business risk of the firm, where the nature of the acquired assets as well as their usage or depreciation and their expected average life are physical characteristics the distinction of which is essential in order to extrapolate the firm's performance and the business risk associated with its earning power in the future. That is, an accounting measurement based on such physical economic attributes eases the distinction of the characteristics of various assets, and accordingly, enables the evaluation of the firm in terms of its expected earning power and associated risk.

Income Measurement:

As it was stated above, the measured net income can be regarded as an economic attribute of two groups of causal relationships, namely, the firm's efforts (causes) and related accomplishments (effects) incurred within a period of time. Also, it was explicitly indicated that net income is neither the only achievement, nor the ultimate accomplishment that the firm should attain.

First, net income is not the only firm's accomplishment because, for example, some degree of risk must be associated with the performance of the firm. Accordingly, risk is an inherent outcome of the firm's activities and affects the achievement of its operating

objective of maximizing its value to its stockholders. In this sense, risk is a part of the firm's accomplishments* and its measurement must be considered and provided for by the accounting function.

Second, net income is not the ultimate outcome or accomplishment that the firm should attain because neither is it the only factor that affects its value to its stockholders nor is its effect on such value explicit and direct. Thus, net income is not an objective by itself and its accounting measurement is considered in this theory only as a means for the evaluation of the firm's performance in relation to its stockholders wealth. That is, net income is a derived economic attribute whose measurement or knowledge is needed in order to study other related causations that bear direct effect on the maximization of stockholders wealth. Dividends payments versus retention of earnings, financing mix or capital structure, changes in the firm's risk, and growth factors are examples of these causal relationships. Thus, once it is measured, net income becomes an important cause affecting the firm's value to its stockholders through its effect on the firm's financing decisions and related risk.

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*Risk may be regarded as a negative accomplishment. Hence, the less the risk associated with the return on the firm's securities, the greater is the accomplishment of the firm's operating objective.

The performance of the firm is, therefore, a systematic sequence of activities involving financing decisions, acquisition and usage of assets, creation of wealth, distribution and reallocation of wealth. These activities together determine the overall combination of expected return/risk characteristics which in turn determine the value of the firm to its stockholders. Therefore, accounting measurement of all financial information, including net income, should follow closely the economic attributes of these activities.

Accordingly, once an asset is recognized, its usage in the firm's activities becomes a new causal relationship which must be accounted for. The physical economic attributes of using various assets and services should be identified as a basis for the measurement of the portion of various causations (the firm's separate efforts or expenses and costs) that enter into the determination of net income. For example, it is important to know whether the economic attributes of a particular causation resulting from a particular activity or a cost center should lead to the recognition of an expense (i.e. costs paid or allocated through depreciation or amortization (cause) in order to obtain a service or goods for sale (effects)). Therefore, in order to ease the identification of various physical economic attributes of a firm's effort as an expense this dissertation makes the following proposition:

(P.10) In order to recognize an expense for net income determination (a) the related business activity must involve an effort or cost necessary and legally incurred to acquire revenues or income, (b) the incurred efforts or costs must be accumulated in terms of the function they serve in order to produce revenue, (c) the related revenues are received or reasonably expected to be received or collected in the near future without additional costs or with negligible amount of additional costs, and (d) items, a, b, and c above are not reversed until the time of the financial reporting.

Note that the attributes related to items, a, b, c and d are to ascertain that the business activity involved be a genuine causal relationship of an economic significance, such as an expense during the period. On the other hand, the attribute of the item b is specifically made to maintain a clear identification of the recognized effort (cause) so that it enables extrapolation of the firm's activity and associated risk.

Moreover, the physical economic attributes of using the firm's resources in a particular activity should be used as a basis for the determination of the dollar magnitude of the related expense. That is, the asset's physical economic attributes should also be used as the basis for identifying the amount of the effort portion of the causal relationship resulting from the usage of that asset

(namely, the asset's contribution to the activity of the firm). For example, in order for the amount of allocated depreciation expense to command a measured economic significance, the depreciation method should be chosen on the basis of the physical attributes of the used asset such as average life usage, obsolescent, maintenance, etc. If these attributes indicate that the asset became useless to the accomplishment of the firm's operating objective, its balance should be written off as a loss. Also, the physical economic attributes of the manner in which goods are purchased or received and sold is the adequate basis for selecting the appropriate inventory valuation method such as Lifo, Fifo, average cost, etc.

Moreover, it is also important to know whether the economic attributes of a causal relationship resulted from a particular business activity, should lead to the recognition of a revenue (i.e. efforts, costs and goods given up in order to acquire another asset as a revenue). Accordingly, in order to ease the identification of various physical economic attributes of the firm's accomplishments as a revenue, this dissertation makes the following proposition:

> (P.11) In order to recognize revenues for income determination (a) it must be the result of an effort necessarily and legally incurred to acquire revenue, (b) revenues must be received or reasonably expected to be collected without additional cost or with negligible amount of additional

cost, (c) revenues are accumulated according to their source (i.e. by products and market segments) which reflect the related firm's producing-revenue efforts, and (d) items a, b, and c above are not reversed at the time of financial reporting.

Note that the attributes of items a, b and d above are made to insure that the business activity involves a genuine causal relationship of an economic significance as a revenue during a particular period. On the other hand, attribute of item c is specifically made to maintain a clear identification of the recognized revenue (effect) so that it enables the extrapolation of the firm's activities and associated risk.

Furthermore, the physical economic attributes of the asset or assets received (cash, accounts and notes receivable) from the particular business activity should be used as a basis for the determination of the dollar magnitude of the related revenues. Such physical economic attributes should be identified in relation to the most reasonable expected usage of the received asset in accomplishing the operating objective of the firm. However, the market price is theoretically considered by this dissertation as a good attribute of the value of the received asset and its physical economic importance to the achievement of the firm's operating objective.

Moreover, once the firm's efforts and related accomplishments become identified, the next step is to know whether these causations have resulted in some favorable net accomplishments (or net income) during the period of measurement. Namely, it becomes important to measure net income which summarizes a large portion of the firm's performance towards its operating objective.

Net income is the excess of the firm's accomplishments over the related efforts. For this reason it was indicated that the recognition of any causal relationship as an expense or revenue for income determination must pass the test of physical economic attributes which identifies whether their informational content is meaningful and useful, and how this came about. However, while these attributes are necessary conditions that must be met and observed, they are insufficient bases for the accounting measurement of net income. That there be a satisfactory recognition of causes (costs) and effects (revenues) requires that they not only be economically meaningful by being related to each other, but also that they are economically so meaningful by being incurred within the same period of measuring the firm's performance. Accordingly, such a time attribute is a second test to prove whether the previously recognized usefulness of a set of causes has produced its ultimate effects on the firm's revenue-producing efforts; it can thus enter into the measurement of a new cause (approximated actual net income) and its effect on the firm's dividends and other related financial decisions.

Furthermore, theoretically there are cases where strict adherence to the previously proposed accounting measurement of assets and net income may become impractical. For example, the proposed accounting measurement would require the recognition of such an asset as small tools and equipments which are acquired to be used over several years yet they involve insignificant dollar amounts. Accounting measurement, as such, may become unwarranted when time and bookkeeping costs are taken into consideration. Accordingly, causal-extrapolatory accounting for insignificant activities that involve capital/expense decisions, should exceptionally sustain an allowance for error to ease its measurement procedures. Thus, in order to have accounting measurement command an economic significance such error allowance should be 1) identifiable by information users, 2) be allowed only after the cause/effect relationship has passed the test of physical economic attributes and 3) not involve significant dollar amounts. The notion of "insignificant dollar amount" is introduced as a restriction on such an application of accounting measurement. Therefore, in order not to preclude the extrapolation and the comparability of the cause/effect relationships of various firm's performances this dissertation makes the following proposition:

> (P.12) The accounting profession should agree on an error level allowable, not in terms of a total dollar amount, but rather as a maximum percentage of net incomes

or EPS of all firms. That is, the total amount of various applications of the allowed error in accounting for any firm should be within $\pm$ % of its net income and EPS.

Accordingly, information users would know that there is a possibility of a specific margin for such an accounting error. The actual known error percentage should also be disclosed in the financial statements. Net income and EPS are chosen as a basis for limiting error application because these two parameters are of a major concern to information users in predicting the firm's expected rate of return/risk characteristics. Accordingly, the above proposition is directly derived from the relativity concept of accounting measurement which was developed in the previous chapter. Where such a concept clearly indicates that accounting measurement of various business activities can not be expected to provide absolute truth. Only relative truth can be derived by accounting for these activities. However, the relative truthfulness of financial information can be improved and enhanced if it is measured relative to some common factor or attribute applicable to the accounting for the activities of various firms. Usage of net income and EPS as a basis for limiting the application of an allowable accounting error is an example of such a common factor or attribute.

The Accounting Measurement of Risk Factors:

The accounting concept of capital structure indicates that the financing mix of the firm can affect its value to its stockholders. Namely, any chosen capital structure can affect the achievement of the operating objective of the firm through its effect on that firm's financial risk. Accordingly, this dissertation makes the following proposition concerning the measurement of financial risk:

> (P.13) In order to have accounting for the firm's capital structure command a measured economic significance for decision-making in relation to the firm's financial risk cause/effect extrapolatory accounting would require that the firm's financing transactions be properly reported according to their sources. Also, the income statement should clearly indicate the portions of income pertaining to each source of financing, namely, equity, preferred stock, debt, etc.

The use of bases for classification of the capital structure other than source will preclude the evaluation of the firm's performance in relation to its operating objective. Only when the financing mix is distinguished by source can the firm's historical business risk and financial risk be segregated, identified and extrapolated.

Furthermore, the value of the firm is a function of the present value of the expected stream of income to its stockholders. This income is in turn a function of the firm's performance in the future. Accordingly, cause/effect extrapolatory accounting would also consider the issuance of a summary of the firm's major policies and expectations as having a measured economic significance for decision-making. This summary does not have to expose the firm's top secrets which would harm its competitive position, but it should, however, emphasize the overall view of the two statements in the following proposition.

(P.14) a) A statement should be formulated of the firm's capital structure indicating how management has formulated its policy of capital structure in the past and whether the financing mix is going to be changed and in which direction the debt/equity ratio will be moving. Also, this statement may indicate whether the changes are to apply to finance working capital, acquisition of fixed assets or just the replacement of another source of financing. However, if these changes involve disinvestment decisions, this, also, should be indicated; b) a statement should be formulated of the firm's dividends policy, indicating how the management has formulated the firm's dividends policy in the past and whether the dividend payout ratio will continue the same or be increased or

decreased. Also, this statement may indicate how dividends decisions are to be made in relation to the firm's financing decisions in the future.

A cause/effect extrapolatory accounting would also consider the measurement and communication of other risk factors as having a measured economic significance to information users. Accordingly, in addition to the above proposition which should help in estimating and predicting the firm's financial risk, this dissertation proposes that:

(P.15) The accounting profession should try to find some attributes to measure and communicate the effects of the separate components of systematic and unsystematic risk on the operating objective of the firm. However, price level accounting as is discussed in the contemporary literature, if properly practiced, will provide an adequate basis for measuring and communicating the inflation risk component of the systematic risk. Moreover, in pursuing the measurement of the total systematic risk and the total unsystematic risk this dissertation proposes that a statement should be made indicating the firm's historical rate of return/risk characteristics, where these characteristics are to be measured in relation to some market return index to be agreed upon by the accounting profession.

Nevertheless, a statement of the firm's historical return/risk characteristics, if properly done, will bring cause/effect extrapolatory accounting closer to the idealistic operating objective of accounting (defined earlier in the last chapter), because if the information therein is extrapolated, it will directly enhance the view of information users about the firm's expected return/risk characteristics. However, it should be understood that this proposition differs from the requirement of the idealistic objective of accounting which will entail the direct usage of the firm's capital budget and other financial policies, in the calculation of the firm's expected rate of return/risk characteristics and in the schedules supporting this type of financial reporting.

Moreover, historical net income figures and other balance sheet items may be used by information users to predict the firm's expected earning power and associated business risk. Assuming, theoretically, that the firm has more detailed historical information about its efforts (costs) and accomplishments (revenues), and accordingly, assuming further that the prediction of its earning power would be more accurate if it is made available by the firm itself, then this dissertation proposes that:

(P.16) A cause/effect extrapolatory accounting will also consider a statement of the firm's most representative historical cost and revenue functions, along with supporting

schedules indicating the historical values of the independent variables, as constituting a measured economic significance in decision-making. The supporting schedules may indicate the historical variable and fixed costs and the methods used in allocating common and joint costs, etc.

This proposition requires a little more elaboration about the measurement and communication of the variable elements of costs and revenues. Assuming that the firm has n sources of revenues and m sources of costs, then by following up equation 5.3 of the previous chapter this dissertation concludes that from the decision-making point of view the quality of the information Φ about the firm's expected total revenue is a function of the quality of the information about the firm's separate components of expected revenue. In notation form

$$\Phi\ [E\ (R_f)] = f\ \Phi\ [\sum_{i=1}^{n} E(R_{fi})] \qquad \ldots\ldots\ldots\ldots\ (7.1)$$

Also, the quality of information about the firm's expected total costs is a function of the quality of information about the firm's separate components of expected costs. In notation form

$$\Phi\ [E\ (C_f)] = f\ \Phi\ [\sum_{j=1}^{m} E\ (C_{fj})] \qquad \ldots\ldots\ldots\ldots\ (7.2)$$

Moreover, the quality of information about the variability (risk) of the expected total revenue is a function of the quality of information about the variability of the separate components of expected revenue. In notation form this is

$$\Phi \left[\sigma (R_f) \right] = f \Phi \left[\sum_{i=1}^{n} \sigma (E (R_{fi}) \right] \ldots\ldots\ldots (7.3)$$

Also, the quality of the information about the variability of total expected costs is a function of the quality of the information about the variability of the separate components of expected costs. In notation form this is

$$\Phi [\sigma (E (C_f)] = f \Phi [\sum_{j=1}^{m} \sigma(E (C_{fj})] \ldots\ldots\ldots (7.4)$$

However, it should be understood that the variability of the firm's total expected revenue is the weighted average of the variability of its separate expected components. Also, the variability of the firm's total expected costs is the weighted average of the variability of its separate expected components. Assuming that there are fixed portions of expected total costs, and revenues, these fixed portions represent constants whose removal from the related above functions does not affect the said implications about the quality of their informational content. Therefore, the remaining components of costs and revenues that vary from one period to another become the major independent variables that determine the variability of the related expected total costs and revenues. Accordingly, they determine the risk character of the firm's expected rate of return. Thus, if total costs are segregated into their fixed

and variable portions (if any), application of this proposition will produce information that can be used not only to ease prediction of the firm's expected net income, but also its associated business risk. In turn, cause/effect extrapolatory accounting largely supports McFarland's proposed method of performance reporting for a business enterprise.[2] According to this idea, the whole form of traditional net income reporting needs to be changed. Although McFarland's proposal is concerned with management accounting, this dissertation sees no reason why some version of it is not to be used as well for financial reporting to outside information users.

As an extension of the previous proposition, this writer now puts forth the hypothesis that variable profit (revenue less variable costs) is a better basis for predicting the business risk characteristic of the firm's expected earning power, while net income is better for predicting this earning power itself. This hypothesis needs to be proved or disproved, however, by an appropriate empirical research.

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[2]Walter B. McFarland, Concepts for Management Accounting, (National Association of Accountants, New York, N.Y., August 1966) Second Printing, p. 69.

CHAPTER VI

ENVIRONMENT OF ACCOUNTING -- CONTEMPORARY CAPITAL/EXPENSE DECISIONS IN THE PETROLEUM INDUSTRY

When an oil producer begins a new operation involving lease acquisition, exploration, development, and production, accounting must be ready to start its function which is described by Paton as: "facilitating the administration of economic activity. This function has two closely related phases: (1) measuring and arraying economic data; (2) communicating the results of this process to interested parties."[1]

It is interesting that the accounting function in the early stage of pre-production in the petroleum industry involves only the financial elements of cost. Mr. Stanley P. Porter states that

> ...the whole effort is directed toward the location of petroleum deposits which, with subsequent development and operation will produce revenue. From the standpoint of the oil company, therefore, exploration accounting is a problem of accounting for costs.[2]

With a slight modification this expression can be read "oil producers look to accounting for pre-production activities in a particular lease as a problem of accounting for costs." For purposes of this

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[1]William A. Paton, Essentials of Accounting (New York: The Macmillan Company, 1949), p. 1.

[2]Stanley P. Porter, Petroleum Accounting Practices (McGraw-Hill Book Company, 1965), p. 24.

chapter, costs of pre-production operations will be broken down into different elements.* These elements are: pre-acquisition costs, acquisition costs, exploration costs, amortization of undeveloped acreage, and finally tangible and intangible drilling and development costs.

Pre-Acquisition Costs

Pre-acquisition costs consist of those expenditures incurred prior to lease acquisition. They include costs of:

(1) Securing exploration privileges:
    (a) without option to acquire the lease (costs of shooting rights)
    (b) with option to acquire the lease (option costs).
(2) Preliminary exploration.

Costs of Securing exploration privileges

Current accounting practices for handling this type of cost is based on the assumption that payments for shooting rights are more closely allied to preliminary exploration costs. Option costs are more closely allied to acquisition costs and accordingly a part or all option costs are usually capitalized even though it may be company practice to expense all other exploration costs. Smith and Brock on this point states:

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*For detailed discussion of the capital/expense decisions in the petroleum industry see the author's M.S. thesis: Abdulfattah Omar Elmadfai, Accounting Theory as Related to Cost Measurement for Income Determination in the Petroleum Industry, Unpublished Thesis, University of Wisconsin, Madison, January 1971.

> ...even though only part of the acreage covered by option is leased, approximately 62 per cent of the oil producers capitalize the full cost, 23 per cent capitalize part of the costs, 10 per cent expense the entire cost and the other 5 per cent have not entered into an option-lease agreement.[3]

Those who capitalize part of option costs are presumably the ones who allocate such costs between revenue expense (in proportion of acreage not acquired) and to capital expense (in proportion of acreage acquired).

Preliminary exploration costs

Preliminary exploration consists of those geological and geophysical operations to determine the feasibility of lease acquisition. In addition to payments for shooting rights, the preliminary exploration costs include payments to be made to the geophysical company, or if the work is performed by the producer's own staff it will include salaries, allowances, supplies, depreciation on equipment and other overhead costs required to carry out the survey.

Current accounting practices of handling preliminary exploration is affected by the same factors affecting accounting for exploration

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[3]C. Aubrey Smith and Horace R. Brock, Accounting For Oil and Gas Producers (Prentice-Hall, Inc., 1959), p. 160.

costs incurred subsequent to lease acquisition. Such factors are (1) tax considerations, (2) outside versus inside costs, and (3) applications of the full-cost concept. Smith and Brock stated that:

> Most companies that capitalize any part of geological and geophysical expenditures charge the entire cost of the general survey to any areas of interest found, a procedure recommended by the Internal Revenue Service for federal tax purposes.[4]

Although it may be the company practice to capitalize all costs of "exploration privileges" as "outside costs,"* the API survey of 1965 indicated that "with regard to shooting rights, which generally are not so large as the other outside cost items, 20 per cent reported that they expense the cost of shooting rights applicable to acreage subsequently acquired."[5]

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[4]Ibid., p. 176.

*"Outside costs" are those payments made to or payable to outsiders--i.e., outside exploration company. They are not incurred by company's own staff as implied by saying "inside costs."

[5]American Petroleum Institute, Division of Finance and Accounting, Report of Certain Petroleum Industry Accounting Practices (New York, 1965), p. 20.

Arguments for capitalization of

Pre-acquisition costs

(1) Option costs are payments in advance for bonus costs which in turn should be capitalized as a major element of acquisition cost. With regard to producers who argue for capitalization, Mr. Horace R. Brock stated:

> The argument is also advanced that the relatively small option payment permits the company to refrain from making huge outlays in the form of lease bonuses which would otherwise be required. Hence, there is no hesitation in capitalizing the entire option cost to acreage selected.[6]

(2) Even if it may be argued that option costs do not represent payment in advance it can be argued that such costs represent a useful asset during the period of preliminary exploration.

> "...an option is tantamount to a temporary lease and that acreage not selected is similar to acreage that has been leased and then dropped."[7]

(3) When an oil producer pays option costs he usually expects to acquire only a portion of land of the lease surveyed. Hence, such costs belong to the portion subsequently acquired, and accordingly no reason exists for not capitalizing all option costs. Brock and Smith stated

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[6]Horace R. Brock, "Petroleum Accounting," The Journal of Accounting (December, 1956), p. 58.

[7]Ibid., p. 58.

that "those that argue for capitalizing the entire amount even though only a part of the acreage is taken reason that a company rarely expects to take all the acreage covered by the option, so that the payment applies to leases actually selected."[8]

(4) Even though it is customary in the oil industry that the majority of exploration costs result in the abandonment of the acreage surveyed prior to or after acquisition, it is not a good accounting practice to expense currently the preliminary exploration costs that are incurred for certain leases whose final outcome is not yet determined.

(5) Pre-acquisition costs are necessarily made to achieve a single purpose which is to acquire crude oil reserves. Thus, they should be capitalized as part of such asset costs. In this sense oil producers incurred such costs to help determine the area of interest to be leased only as part of the whole effort that is required to create from that lease an oil-producing property. Accordingly, if there is any reason to capitalize any part of costs incurred subsequent to acquisition, it is logical to give priority to pre-acquisition costs.

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[8]Smith and Brock, p. 160.

Arguments for expensing

pre-acquisition costs

(1) With regard to those who argue for expensing costs of shooting rights in spite of being directly allocable costs (outside), the API report indicated the reason given is that "those are part of normal, recurring geological and geophysical expenditures, the greater portion of which is applicable to acreage never leased or productive."[9] Also with regard to those who argue for expensing option costs, Smith and Brock stated that "those companies that expense these options think of the payments as being in the nature of normal and recurring geological and geophysical costs which, like experimental expenses of a manufacturer, should be expensed."[10]

(2) The real expenditures that contribute to the discovery of oil reserves, if any, are not those related to the preliminary survey but are those incurred subsequent to lease acquisition. Namely, preliminary exploration costs are directly related to the area of interest to be acquired. Accordingly, Smith and Brock are of the opinion that partial allocation to expense in proportion to the acreage required is reasonable.

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[9]American Petroleum Institute..., p. 20.

[10]Smith and Brock, p. 160.

Acquisition Costs

Oil producers may incur three types of costs that relate directly or indirectly to lease acquisition. First, payments to outsiders which are more easily identified with a particular lease, such as lease bonuses and extension costs, or broker's commissions and other legal and title fees. Second, inside costs not identifiable with a specific lease. These are lease department costs incurred for legal and leasing services. Third, costs of carrying and retaining leases acquired, such as delay rentals and other minimum annual payments and royalties. However, the latter type usually does not occur if the lease is abandoned.

Generally, for the first two types of costs the API reports in 1965 and 1976 showed that with few exceptions all outside costs are capitalized while inside costs are expensed as incurred.[11, 12] For carrying costs, it seems that inside vs. outside costs have no effect on accounting practices. Instead, avoidable and nonrecoverable vs. nonavoidable and recoverable is the basic criterion for the capital or expense decision. The API survey of 1967 indicated that with few exceptions all oil producers expense those avoidable and nonrecoverable (i.e. delay rentals) as incurred.[13] While for minimum payments which are not avoidable by terminating or abandoning the lease before

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[11] American Petroleum Institute..., p. 19.

[12] American Petroleum Institute, Division of Finance and Accounting, Report of Certain Petroleum Industry Accounting Practices (New York, 1967), p. 10.

[13] Ibid.

expiration a less percentage but still the majority (almost two-thirds) of oil producers expense such costs.[14] Mr. Brock arrived at similar conclusions for he indicated in his survey that 47 out of 61 companies expense costs of their own leasing staff,[15] 37 out of 50 companies which paid fixed or mandatory rentals expensed such costs as incurred.[16]

Arguments for capitalization of acquisition costs

(1) With regard to those producers who argue for capitalizing outside costs, the API stated the reason that "all expenditures leading directly to the acquisition of a tangible asset should be capitalzied as part of the cost of that property."[17]

(2) Inside costs also should be capitalized because they are necessary expenditures to accomplish the ultimate purpose of obtaining "oil reserves." Following this, capitalization of outside cost and expensing inside costs makes an oil producer appear as if his business is to purchase goods or "land" for resale. Inside costs are charged off

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[14] Ibid.

[15] Brock, p. 59.

[16] Ibid, p. 61.

[17] American Petroleum Institute (1965)..., pp. 19-20.

as incurred as if they are recurring fixed administrative expenses while outside costs are expensed as the goods are sold.

(3) Cost basis of accounting requires that inside costs be considered as having future benefit and attachment to leases since these leases have not been proven useless. Furthermore, even though inside costs are allocated among leases on an approximated basis, this allocation is better than nothing and a necessary process to the application of the matching concept which requires that for adequate income determination, costs which benefit future periods should be deferred to offset the related future revenues. Smith and Brock stated that

> a few companies capitalize all leasing costs, dividing the total outlay equally among all leases acquired during the year. This is allowed on the theory that every cost leading to acquisition of assets should be capitalized and that, in general, the cost of acquiring one lease is just as good as that of acquiring any other.[18]

Furthermore, Smith and Brock state that "it would be desirable from the view point of accounting theory to capitalize title defense costs, even if performed by regular legal personnel. All incremental costs caused

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[18]Smith and Brock, p. 163.

by the proceedings...should, if the suit is successful, be capitalized to the lease."[19] On the other hand, the API survey stated the reason advanced by one company to capitalize costs of title defense incurred by its own staff is that "the costs are necessary to assure the validity of the lease, and therefore represent additional costs for obtaining exploration and drilling privileges."[20]

(4) What is said about the cost basis and matching concepts in relation to inside costs in part (3) applies also to carrying costs regardless of whether they are avoidable, recoverable or unrecoverable. However, it may be noted that carrying costs are paid to outsiders and accordingly they are more easily identified and allocated to a particular lease. Furthermore, with regard to those who argue for capitalization of unavoidable minimum annual payments the API survey stated that "the primary reason for this practice is: these costs are looked upon as constituting a lease bonus for the acquisition of an asset, with payments made in installments at the request of the lessor."[21] This position taken seems to be supported

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[19] Ibid., p. 165.

[20] American Petroleum Institute (1965)..., p. 21.

[21] Ibid.

by the stand taken by Smith and Brock with regard to mandatory rentals where they stated that

> fixed or mandatory rentals are actually deferred bonuses paid on an installment basis since they are fixed at the date of leasing and cannot be avoided...it is interesting to observe that although accounting theory clearly calls for capitalization of mandatory rentals, a majority of companies charge the payments to current expense.[22]

Furthermore, with regard to delay rentals, Mr. Leo Haynes favors capitalization of these expenditures as additional leasehold cost, for he stated that

> ...the company believes that the cost of the lease at this time plus such rentals as will have to be paid on it until the company is ready to develop the property will be less than the probable cost of the lease at the time when the company expects to be ready to develop it, or the company is willing to pay the cost of the property plus the rentals in order to prevent a competitor from acquiring it. In either case, the rentals paid prior to the beginning of development of the property constitute a part of the investment in the property and should be capitalized.[23]

Arguments for expensing acquisition costs

Usually, only a very small portion of the lease acquired will prove to be a good prospect. Accordingly, substantial amounts of

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[22]Smith and Brock, p. 167.

[23]Leo Haynes, "Accounting for Leasehold Costs in the Petroleum Industry," Journal of Accountancy (April, 1942), p. 327.

acquisition costs should be anticipated as non-beneficial. The best way to provide for these costs is to expense them as incurred. Some would argue that conservative accounting as such is a prerequisite for fair financial reporting. Also, expensing of these costs may be supported by the materiality concept which "says essentially that items of small significance need not be taken seriously."[24] Therefore, the write-off of acquisition costs is not a violation of accounting concepts and principles but rather is the end result of their applications. The API survey of 1965 presented the following reasons for expensing certain parts of acquisition costs:[25]

> -for outside costs: "expensing immaterial amounts in the interests of accounting and clerical simplicity."
>
> -for inside costs: "they are a relatively fixed administrative cost and present an activity that remains reasonably constant... Also, it is considered impracticable to segregate the small portion of company costs that may be applicable to acreage acquired and retained."
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> -carrying costs-delay rentals: "these routine rental payments are in the nature of penalties for not commencing drilling operations. The payments do not add value to the properties or privileges previously acquired."

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[24]Maurice Moonitz, The Basic Postulates of Accounting, Accounting Research Study #1 (American Institute of CPA, New York, 1961), p. 47.

[25]American Petroleum Institute (1965)..., pp. 20-21.

-carrying costs-minimum royalties and other payments: "are routine and incidental to the operation, neither adding to the value of the property nor increasing production."

Exploration Costs

Exploration activity after lease acquisition is a continuous process. It aims to test surface and subsurface composition to help decide whether a specific location is likely to have petroleum accumulations adequate to warrant the risk of further funds for exploratory drilling. Once discovery is made, the exploration stage ends and development of oil reserves begins. Hence, all geological and geophysical costs incurred prior to crude oil discovery are considered as exploration costs. There are three types of exploration costs incurred:

(1) For transportation of facilities, trails, laboratory, core drilling, geological and geophysical equipment, warehouse and office building, etc. These are classified as assets and converted gradually to the second type of costs (operating costs) through appropriate depreciation rates.

(2) For operating expenses required such as salaries and wages, maintenance and reparis, supplies, depreciation (as above) and payments to outside exploration companies, if any.

(3) Cash or acreage drilling contributions.

Oil producers are adopting different practices in accounting for exploration costs. Although some oil producers take a compromise position between capitalization and expensing exploration costs, others either capitalize all exploration costs (the advocators of full-cost concept) or expense all such costs. With regard to exploration operating costs related to acreage acquired and retained, the API survey of 1967 showed that around 75 per cent of oil producers expense these costs if incurred by their own staff while around 65 per cent capitalize such costs when the work is performed by outside crews.[26] Mr. Brock's survey indicated similar results in relation to payments to outside crews, since 63 per cent capitalize all exploration costs.[27]

With regard to drilling contributions, the API survey of 1967 indicated that five per cent capitalize dry-hole contributions and 47 per cent capitalize bottom-hole contributions. When acreage of land is contributed without retaining overriding royalty, the cost may be charged to expense or capitalized as any other exploration costs. When some interest is retained the cost of acreage assigned or contributed is usually maintained as an asset. Furthermore, with regard to drilling contributions received, they may be offset against the contributions given and any difference is to be charged or credited to the income statement. They may be also offset against costs of the test-well drilled.

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[26]American Petroleum Institute (1967..., p. 10.

[27]Brock, p. 55.

Arguments for capitalization

of all exploration costs

(1) Smith and Brock stated that

> ...with supporters of complete capitalization arguing that the production or exploration program as a whole is the proper unit. They examine the problem in the light that all exploration activities are necessary for the discovery of any new reserves, and point out that unfavorable results must be expected as part of the overall program.[28]

(2) The reason that exploration costs incurred by an oil producer's staff are indirect and hard to allocate among leases is not valid to avoid capitalization of all exploration costs. With regard to the overall company's activities, such allocation problem is already solved, where such costs can be allocated and capitalized to all productive leases combined.

(3) Those who argue for expensing all exploration costs fail in their basic assumption that they are able to maintain a fixed commercial quantity of crude oil reserves through constant discovery and development and accordingly this will eliminate the differences between expensing or capitalizing costs of unproductive leases. This assumption is similar to the argument presented by the advocators of the direct costing method for inventories which is not generally accepted.

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[28]Smith and Brock, pp. 173-174.

> Hendriksen stated that "one claim for variable costing is that if inventories are constant from year to year, net income would be the same under either variable or absorption costing except in the first and last years of enterprise life."[29] Furthermore, the assumption of constant crude oil inventories is irrational and a matter far from being realistic, particularly under uncertainty which characterizes the oil industry.

Arguments for expensing all exploration costs

Smith and Brock have offered the following arguments with regard to the supporters of expensing all exploration costs. They contend that:

> -these costs are fixed and do not vary directly with expansion or contraction of exploration activities...The difficulties involved in determining just what portion of costs is incremental (they contend only incremental costs should be capitalized) makes the policy of capitalization difficult, especially where exploration is conducted by the firm's own staff.
> -the practice of expensing such costs eliminates hundreds of hours of detailed work in...assigning costs to specific acreage.

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[29]Eldon S. Hendriksen, Accounting Theory (Richard D. Irwin, Inc., 1965), pp. 209-210.

> -conservatism requires the charging of such costs to expense... because of the doubtful worth of properties to which they apply. -and finally, they contend that "over a period of time, assuming a relatively constant development program, there would be little difference between expensing exploration costs and capitalizing them to be written off by amortization or when leases are surrendered."[30]

The overall arguments advanced in this part are those advanced by the advocators of direct-costing method in accounting for inventories. Exploration costs are said to be fixed and accordingly are not inventoriable but rather they are periodic charges. In other words the stream of such costs are left to expire on a periodic rather than on a product basis. In this sense the direct-costing method encourages conservative accounting applications.

Arguments for partial capitalization or expensing of exploration costs

(1) Arguments for partial capitalization are similar to those advanced previously in relation to the full-cost concept, only with differences that relate to setting oil reserves or leases rather than company-wide activities as the appropriate cost center or productive unit to be accounted for. Accordingly, exploration costs directly associated

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[30]Smith and Brock, p. 172.

with a particular lease or crude oil reserves should be capitalized. Only costs that result in discovery of oil deposits are easily identifiable with a specific lease (i.e. payments made to outside crews) should be considered as an asset having future benefit. With regard to the advocators of capitalizing successful exploration costs, Smith and Brock indicated that generally accepted accounting principles and consistency requirements support such practice. They specifically contend that such principles "also support the matching concept which says that oil revenues and its related costs of finding and producing should enter the income stream at the same time."[31] Furthermore, with regard to possible justification for capitalization of exploration costs paid to outside companies, Stanly stated that "...the costs of survey work done by independent contractors are direct out-of-pocket costs which can be more readily identified with specific properties and allocated to the properties explored, and these costs usually vary in amount from year to year."[32]

(2) Arguments for partial expensing of exploration costs on the other hand are similar to those advanced previously in relation to the full expensing of such costs with the

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[31]Ibid., P. 173.

[32]Ibid., p. 64.

exception that partial expensing is concentrated and restricted to costs that are not readily identifiable with a particular lease or oil deposit. In general, unidentifiable costs as such are those incurred by the oil producer's own staff as well as those unproductive ones. They are considered as excessive or fixed expenditures and there is no way to identify them as being useful assets which contribute to production of future revenues. Stanly described this situation as:

> The current expensing of the overhead partion of exploration costs may be justified on the ground that the overhead is more or less constant from year to year and bears no necessary relationship to field exploration activities. The current expensing of the costs of field surveys conducted by the company's own personnel may also be justified to some extent by the problems involved in deferring such costs and later allocating them between properties acquired or retained and properties released or not acquired, as well as by the lack of major variance from year to year.[33]

Disposition of Investments in Undeveloped Leases

Each lease acquired is usually given an identification number. All costs incurred and capitalized in the stages of pre-acquisition, acquisition, and exploration would be charged to the appropriate account (i.e. undeveloped lease or property account). The type of

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[33] Ibid.

undeveloped propreties and accordingly investments attached thereby may take one of the following directions:

(1) Transferred to developed or producing properties if they are found productive. This will be discussed in the latter part of this chapter.

(2) Gradual surrending or the abandonment of these properties. Gradual surrendering requires the difference between both cost and allowance for amortization (if any) related to the surrendered part to be charged off as expense for the current period. The remaining cost and related allowance for amortization represents the retained part of the lease. If it is wholly abandoned, costs and allowance (if any) should be written off and any difference is considered as an expense for the current year.

(3) Assignment. This will be mentioned in the last part of this chapter in relation to drilling contributions.

(4) Outright sale. If the undeveloped lease is sold, profit or loss on such sale is usually recognized.

(5) The undeveloped lease may or may not be amortized during the period prior to surrendering, abandonment, selling or transferring the lease to producing ones. Accounting practices of oil producers have developed significant questions about the feasibility of such amortization.

The survey of Mr. Brock showed that only thirteen (13) companies out of sixty one (61) amortize these costs.[34] The surveys of the API in 1965 and 1967 showed a tendency towards amortization. Where in 1965, the survey indicated that eleven (11) companies do not amortize but charge the capitalized costs to expense when the lease is relinquished, twenty (20) companies amortize these costs by following different methods.[35] On the other hand, the survey of 1967 disclosed that 56 per cent of oil producers amortize costs of undeveloped properties. Among these producers are 63 per cent of the large companies, 62 per cent of medium-sized, and 42 per cent of smaller size.[36]

The arguments for non-amortization vs. amortization coincide to a great deal with those raised in connection with the capitalization vs. expense decision.

Arguments for non-amortization

One may argue that, since the lease did not yet prove productive and has not been surrendered, it will not only continue to have the same value, but it will become more valuable because of subsequent exploration accomplishments. Therefore, costs capitalized should be

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[34]Brock, p. 63.

[35]American Petroleum Institute (1965)..., p. 27.

[36]American Petroleum Institute (1967)..., p. 13.

carried forward and written off only at the time of surrender or abandonment of the lease. Smith and Brock advanced the following two points as relevant to non-amortization. First, "accounting theory does not sanction any arbitrary method used to equalize reported income from year to year by mere accounting entries." They added, "Accounting statements are not designed or intended to reflect market values, but only historical costs."[37] The first point is supported by W. A. Paton where he stated that the attempt of stabilizing the presentation of income "if not thoroughly bad is certainly open to the most serious question."[38] However, prior to lease surrender or abandonment, costs capitalized can not be considered as a loss. On the other hand, such costs can not be conceived as current expense simply because they do not contribute to the current year's revenues.

Arguments for amortization

On the other hand, one may argue that since there is objective evidence from past experience that a major portion or all the lease would be surrendered, it is a logical procedure to compensate for future surrendering or abandonment in advance by gradual amortization of investments costs. Amortization as such has the merit of avoiding a substantial distortion of the income statement caused by large

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[37]Smith and Brock, p. 183.

[38]W. A. Paton, Accountant's Handbook (New York: The Ronald Press Company, 1949), p. 133.

write offs of these costs in the future as a loss. Smith and Brock in justifying amortization, have described it as: "provision should be made for estimated losses in much the same manner as that accorded bad debts so that costs and revenues may be properly matched."[39]

Costs of Drilling and Development

Once the exploratory test well is found productive, the next stage is the development operations which involve drilling more wells in the located oil reservoir. Once the lease is found productive, it is usually given a new identification number and transferred to producing property. Accordingly, in addition to developing and drilling expenditures, the cost of a producing lease includes all costs capitalized and carried forward from the stage of undevelopment. Costs of drilling and developing a particular lease are usually divided into:

(1) Intangible drilling and development costs (IDC). They include expenditures incurred merely for drilling and development of the wells as well as to acquire subsurface and surface well equipments and their installation up to the commonly known (christmas tree)." Thus, the IDC consist of costs of labor, contractual drilling payments, testing, cementing materials, transportation, camping, district overhead, etc.

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[39]Smith and Brock, p. 183.

(2) Lease and well equipment costs are those tangible items which have salvage value. These include costs of equipment serving one well or the entire lease such as well head assemblies, pumping, separators, storage tanks, roads, buildings, etc. Lease and well equipment costs are generally capitalized and transferred to expense through appropriate depreciation during the production process. Accounting practices concerning IDC showed a wide variation starting from expensing all these costs up to capitalizing all of them. The survey of Mr. Brock shows 46 out of 61 oil producers capitalize only IDC of productive wells.[40] The survey of the API in 1965 and 1967 indicated a similar tendency toward capitalizing IDC of successful wells. Where in 1965 the API survey indicated that 30 out of 32 producers capitalize successful IDC,[41] the survey of 1967 showed that 34 out of 37 producers capitalize these costs.[42] It is quite clear that oil producers distinguish between productive and unproductive or dry-hole's IDC--as is the case in exploration costs--in order to provide a basis for the capital/expense decision.

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[40]Brock, p. 62.

[41]American Petroleum Institute (1965)..., p. 26.

[42]American Petroleum Institute (1967)..., p. 10.

Arguments for capitalization of IDC

(1) All expenditures incurred in acquiring an asset should be embodied in its cost. IDC, including those related to dry holes, should be capitalized because expensing them will result in understatement of assets and net income and is a violation of the principle of historical cost and matching concept. With regard to capitalization of successful IDC, Smith and Brock stated that:

> If historical cost accounting is to be used, the cost of productive wells should be capitalized and amortized against production from these wells. If IDC is expensed as incurred, cost of wells from which future production will come will be charged against current revenues from other properties. Capitalization of IDC may also give a fairer picture of profit and investment since to omit these costs would result in an understatement of investment actually employed in productive assets.[43]

However, it can be argued that there should be no distinction made between successful and unsuccessful expenditures because IDC of dry holes are also productive costs and should receive the same treatment as any other IDC to be capitalized. Such costs of dry holes are necessary expenditures to determine the boundaries of the oil reservoir as well as the location of the other producing wells. Accordingly, they are an essential part of IDC and have a real attachment to the asset finally acquired.

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[43]Smith and Brock, p. 200.

(2) The assumption that IDC are made to replace current production and hence should be expensed as incurred is an invalid one, in that it is only a justification for unwarranted departure from generally accepted accounting principles of cost basis and matching of revenues with related costs. The assumption of production replacement is only a managerial requirement to stay in business and should not affect accounting practices. Because current discoveries and developments do not necessarily equate units of production, a constant quantity of crude oil inventories can not be maintained and the income statement will be distorted through shifting profits from one period to another. Mr. Stanly stated that "the practice results in mismatching current revenue with costs which presumably contribute to future revenue."[44] Furthermore, even if one agreed completely upon such replacement assumption, he should also agree that all costs of pre-production should be expensed as incurred in the sense that they equally contribute to such replacement effort. Consequently, all costs of discoveries and developments incurred during the years of a company's life are to be capitalized and carried forward on a cost basis from year to year. Expensing replacement casts as above with price level changes will result in making historical costs meaningless.

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[44]Porter, p. 130.

Arguments for expensing IDC

(1) The practice of expensing IDC is justifiable by the higher element of risk and uncertainty which must take place. The existence of oil reserves will continue for years without adequate measure of its quantities. Furthermore, it is a well-known fact that IDC has no salvage value. However, if that is the overall situation, it would be more appropriate to give priority to expensing that portion of these costs applicable to dry-holes. Mr. Stanly stated that "the main reason cited in favor of expensing such costs as incurred is that, in themselves, they are unrecoverable and depend for their value on the highly questionable recoveries of natural resources over indeterminate periods."[45]

(2) Other arguments for expensing IDC are similar to those indicated previously by Smith and Brock with regard to expensing all exploration costs. In that sense, there will be little difference between capitalizing and expensing all IDC if there is a relatively constant development program and accordingly it is possible to conceive these costs as being incurred to replace those crude oil quantities currently extracted. With regard to those who advocate expensing all IDC, Mr. Stanly P. Porter stated that:

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[45]Ibid., p. 129.

> ....these are costs of replacing current production and should be recognized as current expense....Once a company is well established with a continuing development program, the current expensing of intangible drilling and development costs has about the same effect upon net income as would capitalization and subsequent amortization through depletion.[46]

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[46] Ibid., p. 130.

CHAPTER VII

EVALUATION OF CAPITAL/EXPENSE DECISION IN THE PETROLEUM INDUSTRY AS A SPECIAL APPLICATION

Reasons for Divergent Accounting Practices

Chapter VI indicated that it was very possible to find one oil producer who incurred and capitalized as an asset similar costs incurred and expensed by another. A normative solution to these contradictory accounting practices through the application of the previous propositions of this dissertation will be easier to grasp if the reader has understood the reasons behind the divergence of these practices. These reasons may be summarized in the following:

(1) Conservative interpretation of risk: Oil companies having different financial capabilities and operating under different conditions differ in their interpretation of risk and, as a result they use different accounting procedures, particularly for pre-production costs.

(2) Materiality vs. good operating conditions: Materiality of pre-production costs in relation to the revenues of an oil producer seem to have a great effect on his capital/expense decision. This is best described by Brock,

> "Most of the larger companies place greater emphasis on conservative financial statements while some smaller ones wish to emphasize "growth" figures...Many of the payments may be small and not considered individually material by larger companies although they may be regarded as important amounts by small ones."[1]

(3) Tax requirements: While the Federal income tax authorities require that the lease be the basic unit for which an accounting should be made, they require capitalization of certain parts of pre-production costs, expensing of other parts, and also give the tax payer the option between capitalization or expensing of the remaining parts of these costs. As a result, Porter has concluded that:

> "While accounting methods have been influenced by tax rules throughout the industry, this influence has been more pronounced among the smaller companies which are not publicly owned. Maintenance of an accounting system is less expensive when supplementary records for tax purposes can be avoided."[2]

(4) Inappropriate segregation between accounting entity and accounting unit or cost center: Some producers have disregarded the lease as the traditional cost center and

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[1]Horace R. Brock, "Petroleum Accounting", The Journal of Accountancy (December, 1956), p. 56.

[2]Stanly P. Porter, Petroleum Accounting Practices (McGraw-Hill Book Company, 1965), P. 16.

considered company-wide activities as the basic unit to be accounted for. These producers inappropriately advocate the full cost concept because they apply it by considering all the company's activities as one program. ARS #11 found that:

> "At least 20 companies in the United States and Canada base their accounting on this concept...The theory advanced is that all finding and development costs are part of an overall effort, the sum of which is expended for what ever result may be obtained."[3]

The Solutions Proposed in the Past

In spite of the active role played by the API division of finance and accounting in order to narrow the differences of accounting practices among oil producers, differences still exist. In late 1969 the AICPA research division issued ARS #11 "Financial Accounting in the Extractive Industry." As far as capital/expense decision in the petroleum industry is concerned, the recommendations of this study may be summarized in the following:[4]

(1) Since the leases are acquired by different transactions, ARS #11 disapproves the lease as an appropriate cost center because it will lead to different depletion and amortization rates. But if it happens that these transactions

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[3]Robert E. Field, Financial Reporting in the Extractive Industry, Accounting Research Study #11 (New York: American Institute of Certified Public Accountants, Inc., 1969), p. 23.

[4]See Recommendations 1-5 Ibid., p. 150.

are accounted for on the basis of oil reserves, only costs directly identifiable with these reserves will be capitalized, and accordingly the variances of depletion and amortization rates among these reserves would be eliminated. Comparability is thus achieved. So ARS #11 argues for the oil reserve as the appropriate cost center with which costs should be identified.

(2) Prospecting, indirect acquisition, and most carrying costs should be expensed when incurred.

(3) Direct acquisition costs should be capitalized even if the property is unproven, and the estimated loss portion should be amortized to expense as a part of the current cost of exploration.

(4) Unsuccessful exploration and development costs should be expensed even though incurred on property units where commerically recoverable oil reserves exist.

Therefore, this study recommends that the only costs that should be capitalized are those that immediately establish the presence of oil reserves and that directly contribute to the development of these reserves thereafter. A very large portion of pre-production costs should be expensed as a result. This study does not, therefore, seem to be capable of solving the real problems giving rise to the diverse accounting practices in the petroleum industry.

The Normative Solution

A feasible solution to the said problem must be a normative, yet neutral and practical one in relation to all conflicting interest groups in the petroleum industry. Throughout the rest of this chapter the previously derived accounting propositions in this dissertation are to be used as a basis for developing a solution to the capital/expense decisions of the petroleum industry. Accordingly, such a solution entails first a definition of an appropriate cost center with which costs should be identified and accumulated.

The lease is a normative cost center:

Proposition #8 requires that the firm's performance be divided into separate activities and that such division be made consistent with the objectives of 1) easing the identification of various causations and related physical economic attributes, and 2) making the extrapolation of these causations possible and meaningful. Therefore, a cause/effect extrapolatory accounting would entail that the lease be the most appropriate cost center because it goes directly to the application of cause/effect relationship in acquiring an asset (oil reserve). As opposed to ARS #11 cause/effect extrapolatory accounting recognizes these arguments for the lease as a cost center:

(A) It is not necessary to have all leases as cost centers charged with similar amounts of costs in order to achieve comparability. Rather, differences in costs resulting from different locations, transactions and operating conditions are the focus of comparability.

(B) It is not only because of the tax requirement that the lease should be used as a cost center, but also because the lease may be the accounting unit on which basis the oil operator should report to his co-partners -- i.e. the assignor, and the landowner. Thus, the use of the oil reserve as a cost center will eliminate the comparability needed on a lease-by-lease basis.

(C) Although the use of oil reserves will elminiate many excessive costs needed for overhead costs allocation when the lease is the cost center, it adds other burdens of costs which are required for:

a) maintaining another set of accounting records for reporting to tax authorities and co-partners;

b) determining which of the exploration and development costs are directly identifiable with discovery and development of a particular oil reserve and accordingly, should be capitalized;

c) when the field (group of oil reserves having costs in common) is used as a cost center, additional costs are required to solve the problem of common costs allocation among these reserves when such allocation is required -- i.e. sale or assignment of one or more of these reserves. However, this problem remains much the same even when the lease is used as a cost center.

Therefore, choosing a cost center other than the lease can theoretically result in an accounting information which is inadequate for the evaluation and the extrapolation of an oil producer's performance in relation to its operating objective. Proposition #7 clearly indicates that methods and procedures of accounting measurement and communication of information should not be the reason for precluding the extrapolatability of various cause/effect relationships pertaining to the business activities. Accordingly, the only way to avoid such an undesired outcome is to use the lease as a cost center in accounting for oil and gas producers.

Measurement of the capital/expense decision in the petroleum industry:

In general, this dissertation recognizes that ther is a relationship between the causes (efforts expended) and related effects (accomplishments received) only when they are compared on the basis of

the individual lease as the basic productive unit (or cost center) to be accounted for. Propositions 10 and 11 clearly indicate that in order to recognize expenses and revenues for income determination, the related business activities must involve an effort or cost necessary and legally incurred to acquire an accomplishment or revenues. Also, it was stated, with some expectations, that these expenses must be incurred and related revenues must be received within the same period of accounting measurement. Accordingly, there is no meaningful relationship between costs or efforts incurred in a lease whose final outcome has not been proven yet and revenues or accomplishments received from already producing leases. Thus, these pre-production costs or efforts can not be meaningfully introduced into the current measurement of net income for they have not contributed to the revenue-producing efforts of the current period. On the other hand, the application of proposition #9 would require that in order to recognize the business activities of acquiring oil reserves in a particular lease as an asset, 1) these activities must involve some efforts or costs necessarily and legally incurred to acquire oil reserves, 2) the incurred efforts and costs are accumulated in relation to that lease or cost center, 3) oil reserves are acquired or reasonably expected to be acquired through exploration and development and 4) the acquired or expected to be acquired oil reserves will contribute to the accomplishment of the firm's operating objective by having a commercial

quantity of crude oil and/or gas. Therefore, all pre-production costs related to a specific lease, directly or indirectly, are necessary expenditures for subsequent discovery and development of oil reserves. Hence, all of these costs must be identified with the related leases and capitalized as an asset. It is hard to say that bonus costs are directly identifiable with final acquisition of oil reserves while delay rentals are not. Both costs are necessary expenditures to get the signature of the landowner, and they equally contribute to asset acquisition. Also, preliminary exploration costs are necessary expenditures to acquire the lease which is a prerequisite to acquire the right to, as well as discovery and development of, oil reserves.

Moreover, all pre-production costs,paid directly or indirectly are, by their nature, necessary expenditures and are integrated parts in the overall effort expended in a particular lease to acquire asset "oil reserves." These expenditures have a real and genuine attachment to the lease under-surface oil reserves, if any, and they form a basic element of production costs in the future. Thus, all pre-production costs should be accumulated and capitalized on a lease by lease basis in order to reflect the costs of an asset acquisition and should expire on a product rather than periodic basis. Accordingly, the so-called unproductive or unsuccessful exploration, drilling and development costs should be capitalized to the related leases, because they are necessary expenditures incurred in order to distinguish the productive land within the lease from the unproductive.

The proposed accounting on the lease as a cost center requires that the unsuccessful operations become an integrated part of the successful effort whose costs should be capitalized as incurred in order to record historical facts of business activities.

While this criterion restricts the capital/expense decision to the cause-and-effect relationship determined in each individual lease, it does not prevent the recognition of losses as incurred. Mr. Porter stated that:

> It is self-evident that there is no cause and effect relationship between finding costs and revenue attributable to such costs until production commences. Current revenue is the result of finding efforts which have been brought to fruition, not of those efforts which are still short of the goal. Petroleum-finding costs do not become expenses (although they may become losses) prior to the time they result in production for the same reason that they are not expenses when incurred: i.e., they have not yet contributed to revenue.[5]

Consequently, neither the absence of retained earnings nor the absence of revenues warrants the non-recognition of losses when they are objectively determined. In the absence of retained earnings, the appropriate place for these losses is a deficit account. Also, the absence of revenue is not a valid reason for non-recognition of these losses because they are not expenses which contribute to revenues, but rather, they are costs that should be written off and shown as a reduction of stockholder's equity or the proprietor's capital

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[5]Porter, pp. 300-301.

account. The investors are better served by financial reporting which shows that their equity cannot be preserved intact since profitability from the particular lease becomes impossible to accomplish.

Capital/expense decision and timing of loss recognition:

All pre-production costs are by their nature similar in that they are intended to serve the sole purpose of discovering and developing oil reserves. Therefore, all elements of pre-production costs incurred within a particular lease must be measured on the basis of one common principle, whereby they should be all capitalized or all expended. Since the lease is the basic productive unit to account for, cause-and-effect relationships must be measured on this basis. Namely, revenues to be received from the lease should be matched against related costs. Therefore, cause/effect extrapolatory accounting would require that the final outcome of the individual lease must determine the timing of loss recognition. Thus:

(1) If the lease has not been acquired at all, pre-acquisition costs related to that lease should be written off as losses.

(2) If the lease is acquired, all costs of pre-acquisition, acquisition, exploration and developed should be capitalized and maintained in the proper lease investment account. Therefore, it should be realized that:

(A) The conventional distinction of whether pre-production costs are normal and recurring is an inappropriate basis for capital/expense decisions because it causes these costs to be improperly measured in relation to the purpose from their incurrence which is the acquisition of an asset, "oil reserves." This distinction and the related accounting measurement does not, therefore, express the economic significance of these costs in relation to the firm's operating objective.

(B) The traditional distinction of whether pre-production costs are inside or outside costs is an inappropriate basis for the capital/expense decision for the same reason above. Inside costs, do, however, raise the critical accounting problem of identifying them with a particular lease.

(C) The distinction of whether pre-production costs are avoidable and nonrecoverable or nonavoidable and recoverable is also an inappropriate basis for its capital/expense decision for the same reasons as above.

(D) Acquisition of an asset (land) other than the asset intended to be acquired (oil reserves) is also an inappropriate basis for the capital/expense decision of pre-production costs in the petroleum industry.

(E) The application of the materiality concept in terms of a dollar amount is inappropriate for the capital/ expense decision because it opens the doors to severe diverse accounting practices under the same conditions and, in turn, precludes comparability among firms. What may be considered material amount by one firm may not be by other firms. Thus, what is needed is a common standard for the application of materiality so that the measured economic significance of the activities of various firms is not destroyed in relation to the measurement and evaluation of their operating objectives.

(F) Insisting that the incurred costs, in order to be capitalized, must immediately result in the acquisition of an asset is an inappropriate basis for the capital/ expense decision because assets are different in nature and various firms don't operate under the same conditions.

(G) Although the distinction between whether costs are productive vs. unproductive, or successful vs. unsuccessful, does command great economic significance in the classification of pre-production costs as an asset as well as in the measurement of the operating objectives of the firm; it is an incomplete basis for the capital/ expense decision because it is open to subjective interpretation and in turn to diverse application by oil producers.

(H) Maintenance of some level of production is a managerial policy requirement necessary in order for the firm to stay in business, but it can't be considered an appropriate basis for the capital/expense decision of accounting measurement.

(3) The disposition of the investment account must await the final outcome of that lease. Neither the events of partial or whole acquisition of the area originally surveyed nor the subsequent events of gradual surrendering of the lease should affect the capital/expense decision or the disposition of investment account.

(4) If the final outcome of the lease indicates a profitable commercial production, investment costs should be allocated to periodic revenues by using an appropriate depletion rate. However, if the lease is found unproductive and/or is abandoned, the investment should be recognized as a total loss.

(5) If the lease is found to contribute to future revenues less than the accumulated investment costs, a partial loss should be recognized in the amount of the difference between expected receipts and related investment costs.

Finally, it should be noted that the application of the full-costing concept to the lease as the cost center has merits that neither "oil reserves" as recommended by ARS #11 nor the "company-side

activities" can command. That is, its chances to be accepted by small and new as well as major oil producers seems to be more realistic and practical, since the capital/expense decision on this basis approximates a middle point between 1) the too conservative accounting practices and 2) the unconservative approach of company-wide activities. Furthermore, it satisfies both large and small producers because it coincides to a great deal with Federal tax requirements as well as reporting obligations to co-partners. Thus, accounting on a lease by lease basis eliminates large amounts of excessive costs that are otherwise needed to meet these reporting requirements. It has long been argued that tax requirements should not affect the application of sound accounting principles for adequate financial reporting. However, in the petroleum industry the IRS's basic requirement to treat the lease as the cost center seems to be theoretically superior.

Accordingly, the final outcome of the lease is the basis for deciding on the proper disposition of pre-production costs. Costs should be capitalized as incurred from the beginning of a particular lease operation so that a proper accounting for oil inventories is achieved.

CHAPTER VIII

SUMMARY OF THE DISSERTATION

The traditional accounting theory has been criticized largely because the information produced falls short of the needs of outside decision-makers, particularly the public investor. This inconvenient situation persists and becomes even worse in the case of accounting for the petroleum industry. One major reason that has been cited for this shortcoming is inherent in the practical approach upon which this theory is heavily based; supposedly under this approach the needs of management and the accountants have been given too much concern in the formulation of accounting theory and related practices.

Therefore, this dissertation has sought a normative approach to laying down a feasible basis for formulating an accounting theory that is neutral with respect to the three conflicting interest groups in the accounting methodology - namely the accountants, the management, and the outside information users. The contemporary accounting practices of capital/expense decisions in the petroleum industry is, then, evaluated as a special application of this theoretical study.

In order to be normative, the said theory must be deduced from within the accounting environment itself. Consequently, for the purpose of this study, business sciences are considered by this writer to include the best description of the environment within which accounting must function and operate. Thus, as a first step in such deductive reasoning, some important parts of these sciences were carefully investigated and then integrated throughout Chapters I, II, and III with the hope of reaching adequate generalizations about the environment of accounting (see Appendix A). All the generalizations reached in this respect center around one focal point: that the success of the inside as well as the outside, financial decisions depends on how far the concerned decision-makers are capable of an adequate prediction of the future performance of the business enterprise, and accordingly, are able to resolve the related uncertainty problems. Therefore, providing adequate information for the evaluation of the firm's activities under conditions of uncertainty is the most important role that the accounting function should play in its business environment.

Furthermore, in Chapter IV a group of basic integrated accounting concepts were derived from the findings in the descriptive generalizations (see Appendix B). The concepts of neutrality and practicality may be regarded as being general in nature, for they are concerned with the overall quality of formulating an integrated theory and the application of its proposed solutions. Therefore, these concepts likewise apply to the applications of the next group of basic

concepts. On the other hand, the concepts of measured economic significance, prudent uses of accounting information, relative truth, expected return and risk, divisionality of total risk, common stock valuation and the relevancy of capital structure and dividends policies may be regarded as being specific in nature, for they are directly related to the description of the needs of information users. That is, these concepts deal directly with the quality of those accounting propositions developed thereafter, as well as with the related methods and procedures of measurement and communication of financial information. Furthermore, this dissertation has concluded that limited attention has been given to the establishment and definition of a clear objective to be served by accounting. Accordingly, in seeking a normative solution to the contemporary problems of accounting practices, this dissertation sought also in Chapter IV a solution that is consistent with an overall operating objective of accounting which is to be properly defined in relation to its previously described environment. This is so since the guidance and evaluation of these practices must be based on a pre-formulated set of normative propositions or principles, the normativity of which is to be derived from within an operating objective and the related accounting concepts (all propositions are listed in Appendix C).

Discussion of various descriptive generalizations made about the environment of accounting and, in particular, the specific set of accounting concepts indicates that adequate prediction of the future performance of the firm for financial evaluation purposes entails

determination of the expected return/risk characteristics of the firm as a whole and/or as a group of separate activities. Therefore, resolution of uncertainty through risk/return analysis is the main problem involved in adequate financial decision-making. Consequently, proposition #1 of this study indicates that an ideal operating objective of accounting would be the measurement and communication of the firm's expected rate of return/expected risk parameters and the related supporting schedules required for the evaluation of the firm as a whole and as a group of separate activities in relation to the operating objective of maximizing its value to its stockholders. Hence, the calculation and estimation of the expected revenues and costs as they are related to the firm's financial policies and decisions become, under proposition #2, the primary basis of accounting for the firm's expected return and associated risk. Accordingly, the last proposition explicitly requires that the firm's financial policies and related capital budgeting plans be used in the measurement and communication of the firm's expected return and variability of return, as well as the supporting schedules.

However, the involvement of the accounting function in a direct measurement and communication of the firms expected return/risk characteristics and the direct use of the firm's financial plans for this purpose creates some theoretical difficulties (see pp. 17-19)

which seem to make the said ideal operating objective of accounting impractical. Therefore, as the concept of practicality is introduced, this dissertation has concluded that such idealistic accounting practices should be reduced over a temporary planning period of accounting reform to some practical level.

On the other hand, the abandonment of the idealistic objective should not preclude the fact that decision-makers still need adequate information for the evaluation of the firm's performance in terms of its expected return/risk characteristics. Consequently, such information should, somehow, be obtained. In so far as reporting to outside users is concerned, the abandonment of the idealistic approach leaves financial accounting to deal only with the measurement and communication of the past performance of the firm. Thus, the resulting accounting information can not be expected to be directly incorporated (as opposed to the expected return/variability of return parameters, which would otherwise be provided by the idealistic approach) into a users' decision-making. That is, accounting measurement and communication of information which emphasizes the past performance of the firm has only a historical value to decision-making under conditions of uncertainty, where the value of such information, essentially, depends on its appropriateness to the users as well as on the ability of these users to apply it in predicting the firm's expected return/risk characteristics. Accordingly, the produced historical accounting information commands an economic significance only in so far as it can make prediction of

the firm's future performance possible and adequate for financial decision-making. In turn, the previous discussion of introducing the concept of practicality, along with the effect of the application of the other basic integrated concepts, has allowed this dissertation to conclude a normative and yet a practical operating objective; accordingly, it is considered under proposition #4 that accounting is the neutral measurement and communication of all possible historical information bearing an economic significance to a prudent and a feasible evaluation of the firm (both as a whole and as a group of separate activities) with respect to its operating objective of maximizing its value to its stockholders.

Therefore, accounting function must measure all the inside events and conditions that are capable of being measured in terms of their economic significance to a prudent evaluation of the firm. Then, it should properly communicate the measured economic significance to information users. In carrying out this function, the accountants' attitude, as well as their instruments of measurement, should remain neutral.

Furthermore, it was indicated that a close adherence to the above operating objective requires in turn a clear answer to the question of what are the attributes that make a prudent financial analyst decide that a given piece of data is needed in his work of evaluating the firm. Ideally the answer to this question must be based on thorough emperical research which is beyond the immediate

purpose of this dissertation. However, the basic concepts, particularly the specific ones, which have been derived from the description of various evaluation models and the limitations of the related basic data, indicate that there are three major attributes or conditions that must exist in order to satisfy the needs of a prudent financial analyst. The data must concern the outcomes of business events and transactions that affect the accomplishment of the firm's operating objective (proposition #5). This is a quantitative condition or attribute concerning the overall quantity or volume of data, or measured economic significance, that is needed by a prudent financial analyst, and accordingly such data should be included as accounting information. On the other hand, the outcomes of the business events and transactions have a measurable economic significance only if the informational content of such outcomes is extrapolatable into the future and if there is an economically meaningful cause/effect relationship which gives rise to these outcomes. Therefore, the extrapolatability of business outcomes and the existence of a meaningful cause/effect relationship in their occurrence are two major qualitative conditions or attributes that are pre-requisite to the consideration of any informal content (data) concerning these outcomes as having a measured economic significance in decision-making, and accordingly, to the inclusion of such content as measurable accounting information (proposition #6).

Moreover, the accounting measurement under the previously defined practical operating objective is essentially cause/effect

extrapolatory accounting. The above three conditions or attributes are interrelated in describing the information needs of a prudent financial analyst, and no one of them, with the exclusion of the others, holds satisfactorily for this purpose. The feasible extrapolation and usage of any financial data essentially requires that this data be concerned with a constructive cause or effect, and that this cause or effect belongs to a meaningful economic relationship that is directly or indirectly identifiable with the achievement of the firm's operating objective. Thus, business information that can not for any reason be extrapolated into the future in terms of its impact on the firm's expected return and risk is useless for the evaluation of the firm and the decision-making based upon it, and accordingly, it is not submittable to accounting measurement under this integrated theory. For example, information concerning business events that have no genuine cause or whose cause has no effect on the realization of the firm's operating objective can not be said to belong to a meaningful economic relationship, and its measurement should not fall within the domain of accounting function.

In order to be useful,information must be quantitatively and qualitatively sufficient in relation to the purpose of its usage. Therefore, the general quantitative and qualitative propositions mentioned above were clearly made to insure the usefulness of the accounting measurement and communication of financial information. Namely, these propositions are to insure that the processed information possesses an economic significance for financial decision-

making. In order to achieve this purpose, these propositions explicitly call for the accounting function to emphasize the identification of the various economic relationships (causes and related effects) resulting from the individual business transactions, events and conditions, and then to measure these causation relationships in terms of their impact on the firm's return and risk characteristics, which in turn determine how far the firm has accomplished its operating objective.

Therefore, Chapter IV clearly indicates that the measurement of the impact of these causation relationships on the firm's expected return and risk must be based on the physical economic attributes which arise from various business transactions and events comprising the firm's performance. A physical economic attribute implies that a certain business transaction or action has affected the outcome of a particular activity or group of activities and, accordingly, that they affect, or are expected to affect the accomplishment of the overall operating objective of the firm. Accordingly, identification of these attributes calls for a close observation of the firm's performance such as physical processing of raw materials, movements and uses of physical things, as the buying and selling of goods, the nature and use of labor, etc.

Moreover, in order to emphasize the measurement of the economic significance of the firm's activities, the quantitative and qualitative propositions call for the accounting to follow as closely as possible the physical economic attributes of the various causation relationships pertaining to these activities. That is, these attributes are the basis for identifying whether a cause has produced

an effect on the achievement of the operating objective of the firm and how that effect has taken place.

Consequently, methods and procedures of data gathering and processing should be neutral, so that the identification, measurement and the extrapolation of various economic sttributes of the firm's activities, are not precluded (proposition #7). For this same reason, the firm's performance should be divided into separate activities (i.e., according to major products or market segments), each activity consisting of a number of definitely related pairs of causal relationships (proposition #8). Accordingly, such division, whether it is upward towards larger size activities or downward towards smaller size activities, should be made consistent with the purpose of obtaining direct identification of the largest possible dollar magnitude of these relationships. Such a division is essential in order to minimize the arbitrary allocation of common costs (causes or efforts) and revenues (effects or accomplishments) which represent an obstacle in cause/effect extrapolatory accounting.

Moreover, physical economic attributes of all business activities, including net income, should be measured and reported consistently with the information needed for evaluating the firm's performance towards its operating objective of maximizing its stockholder's wealth. Thus, causal extrapolatory accounting carries accounting measurement and communication of information beyond the requirements of the traditional measurement of net income and other balance sheet items. Traditional financial statements do not show

enough information to evaluate how far the firm has accomplished and is expected to accomplish its operating objective. For example, such factors as the overall intentions of earnings retention vs. dividend payments, the effect of changes of the assets' composition on the firm's business risk, and the effect of changes in the financing mix on the firm's financial risk are equally important in portraying the firm's accomplishments towards the said objective. The difference in accounting emphasis, between the conventional accounting measurement and this integrated theory, is clearly due to the difference in emphasis as to what may constitute an appropriate operating objective of the firm and that of accounting. For instance, since this integrated theory has accepted, in advance, the maximization of the stockholders wealth as the ultimate operating objective of the firm, it does not consider net income (conventionally known as changes in net worth) as the only achievement that the firm should seek in order to realize that objective. While net income has important implications as to the firm's past and future dividends and financing policies and accordingly it significantly affects the achievement of the firm's operating objective, it is not the only major factor that the accounting function should seek to measure and report. Consequently, business risk, financial risk, growth factors are other decision variables as important as net income in the evaluation of the firm, and they should be provided for in accounting measurement.

Chapter V applies the previous conclusions to the accounting measurement of assets, income and risk factors. Net income is regarded as the difference between a group of the firm's efforts (used assets and resources) and a related group of the firm's accomplishments (revenues or assets received) over a specified period of time. Accordingly, measurement of net income should be based on the physical economic attributes of these two related groups of causal relationships or efforts and related accomplishments.

However, these efforts and accomplishments are related to the acquisition and utilization of the firm's economic resources. Therefore, acquisition of an asset and its usage thereafter are regarded in this integrated theory as two distinctive causal relationships and accounting identification and measurement of the physical economic attributes of each of them must be made consistent with the purpose of providing adequate information for evaluating their impact on the operating objective of the firm.

Proposition #9 describes the physical economic attributes needed to support the recognition of a particular causal relationship as an asset. If these physical economic attributes support the existence of only the cause or only the effect, there is no meaningful and genuine causal relationship whose accounting measurement can constitute an economic significance as an asset.

Moreover, once an asset is recognized, its usage in the firm's activities creates a new causal relationship which must be accounted for. The physical economic attributes of using various assets and

services should be identified as a basis for the measurement of the portions of various causations (the firm's separate efforts or expenses and costs) that enter into the determination of net income. Proposition #10 describes whether the physical economic attributes of a particular causal relationship resulting from a particular activity or a cost center should lead to the recognition of an expense - i.e. costs paid or allocated through depreciation or amortization (cause) in order to obtain a service or goods for sale (effects). If these attributes indicate that the asset becomes useless to the accomplishment of the firm's operating objective, its balance should be written off as a loss.

Proposition #11 describes whether the economic attributes of a causal relationship resulting from a particular business activity should lead to the recognition of a revenue - i.e. efforts, costs and goods given up in order to acquire another asset as a revenue.

Furthermore, once the firm's efforts and related accomplishments become identified, the next step is to know whether these causations have resulted in some favorable net accomplishment (or net income) during the period of measurement. Namely, it becomes important to measure net income which summarizes a large portion of the firm's performance towards its operating objective. Net income is the excess of the firm's accomplishments over the related efforts. For this reason, it was indicated that the recognition of any causal relationship as an expense or revenue must pass the test of physical economic attributes which identify whether their informational

content is meaningful and useful, and how this came about. However, while these attributes are necessary conditions that must be met and observed, they are insufficient bases for the accounting measurement of net income. That there be a satisfactory recognition of causes (costs) and effects (revenues) requires that they not only be economically meaningful by being related to each other, but also that they are economically meaningful by being incurred within the same period of measuring the firm's performance. Accordingly, such a time attribute is a second test to prove whether the previously recognized usefulness of a set of causes has produced its ultimate effects on the firm's revenue-producing efforts; it can thus enter into the measurement of a new cause (approximated actual net income) and its effect on the firm's dividends and other related financial decisions.

Moreover, theoretically there are cases where strict adherence to the previously proposed accounting measurement of assets and net income may become impractical. For example, the proposed accounting measurement would require the recognition of such an asset as small tools and equipment, which are acquired to be used over several years yet involve insignificant dollar amounts. Accounting measurement, as such, may become unwarranted when time and bookkeeping costs are taken into consideration. Proposition #12 which is derived from the relativity concept, requires that accounting for insignificant activities that involve capital/expense decisions should sustain,

under certain conditions, an allowance for error to ease its measurement procedures. Thus, the items in the above example may be expensed if the described conditions are met.

Furthermore, it was emphasized earlier that net income can not be regarded as the firm's only accomplishment because, for example, some degree of risk must be associated with the performance of the firm. Accordingly, risk is an inherent outcome of the firm's activities and affects the achievement of its operating objective. In this sense, risk is a part of the firm's accomplishments and its measurement must be considered and provided for by the accounting function. Therefore, the remaining propositions (13 through 16) were derived to deal with accounting measurement and communication of risk factors.

Chapter VI indicated that petroleum accounting practices are so contradictory that for each type of pre-production costs it is possible to find an oil producer who has capitalized such costs while another producer has expensed it. The major reasons for these contradictory accounting practices are discussed in Chapter VII and are found to include: 1) conservative interpretation of risk, 2) materiality of the costs incurred and the operating conditions of the oil producer, 3) tax requirements and 4) inappropriate distinction between accounting entity and accounting unit or cost center. A feasible solution to this problem must be normative, yet a practical and neutral one in relation to all conflicting interest

groups in the petroleum industry. Accordingly, such a solution entails, first, a definition of an appropriate cost center with which costs should be identified and accumulated. Proposition #8 implies that the lease is the most appropriate normative cost center because it goes directly to the application of cause/effect relationship in acquiring an asset (oil reserves). Choosing a cost center other than the lease can theoretically result in accounting information which is inadequate for the evaluation and the extrapolation of an oil producer's performance in relation to its operating objective. Proposition #7 clearly indicates that methods and procedures of accounting measurement and communication of information should not be the reason for precluding the extrapolation of various cause/effect relationships. Accordingly, the only way to avoid such an undesired outcome is to use the lease as a cost center in accounting for oil and gas producers.

On the other hand, propositions 10 and 11 clearly indicate that in order to recognize expenses and revenues for income determination, the related business activities must involve an effort or cost necessary and legally incurred to acquire an accomplishment or revenues. Also, it was stated, with some exceptions, that these expenses must be incurred and related revenues must be received within the same period of accounting measurement. Accordingly, there is no meaningful relationship between costs or efforts incurred in a lease whose final outcome has not been proven yet and revenues or accomplishments received from already producing leases. Thus, pre-

production costs or efforts can not be meaningfully introduced into the current measurement of net income, for they have not contributed to the revenue-producing efforts of the current period. On the other hand, the application of proposition #9 would require that in order to recognize the business activities of acquiring oil reserves in a particular lease as an asset, 1) these activities must involve some efforts or costs necessarily and legally incurred to acquire oil reserves, 2) the incurred efforts and costs must be accumulated in relation to that lease or cost center, 3) oil reserves must be acquired or reasonably expected to be acquired through exploration and development and 4) the acquired, or expected to be acquired, oil reserves must contribute to the accomplishment of the firm's operating objective by having a commercial quantity of crude oil and/or gas. Therefore, all pre-production costs related to a specific lease, directly or indirectly, are necessary expenditures for subsequent discovery and development of oil reserves. Hence, all of these costs must be identified with the related leases and capitalized as an asset.

However, cause/effect extrapolatory accounting does not prevent the recognition of pre-production costs as a loss if the lease is found unproductive and/or abandoned. Accordingly, cause/effect extrapolatory accounting under this integrated theory only requires that the disposition of the investment account must await the final outcome of the related lease.

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APPENDIX A

BASIC GENERALIZATIONS ABOUT THE ENVIRONMENT OF ACCOUNTING

1. A normative solution to the problems of contemporary accounting practices is required. Serving the business and economic environment of the society should be the underlying objective of such a solution. Therefore, any proposed solution should be derived from within the accounting environment itself.

2. The possibility of existing opposing interests in the accounting methodology requires that the attitude of the accounting profession, as well as its instruments of measurement, remain neutral with respect to various information users.

3. Managements and regulatory authorities, such as the SEC and the IRS, are likely to resist any sudden proposed change in accounting practices. Also, some inadequacies, if any, within the accounting profession - e.g., lack of competance and an increase in accountants' responsibility - are likely to be obstacles in applying new solutions. Therefore, any theorization on a normative solution to the problems of accounting should preserve some degree of practicality in application.

4. The expected return $E(r_p)$ from a portfolio depends directly on the expected return from the individual assets or securities in that portfolio.

5. The risk of the security σ_i, as well as the risk of the portfolio σ_p, depend very little on the variability of the security's expected return and to a very large extent on the covariance of the security's expected return with the expected returns on other securities in the portfolio.

6. Determination of a security's expected return $E(r)$ and risk involves uncertainty which faces the individual with a most unpleasant situation in making his investment decision. Therefore, adequate accounting information should be made available to predict the expected return/risk characteristics of the firm's securities. Both expected return and risk are of equal importance in decision-making and accordingly, accounting measurement should give them equal attention.

7. Expressing the economic significance of the operations of a business enterprise is the highest informational quality that accounting measurement should emphasize. Hence, the idea of uniform accounting practices for all business enterprises is rejected, for the measurement of the economic significance of the operations of two firms, different by nature, may require the use of different methods of depreciation and inventory valuation, etc. Business transactions and events of various firms have different physical attributes that can affect the economic significance of their activities. Thus, uniformity of accounting practices should be narrowed down to cover firms with identical operations.

8. Information about specific investment assets or security return possesses an economic significance in decision-making, not in its own right, but in relation to the information of other assets or securities returns. Accordingly, the use of the co-variance and the expected return of various securities for decision making, presumes the comparability of their source data. That is, such data do represent the economic significance of the activities of the concerned firms. However, if the economic significance of various business operations is set as the basis to accounting measurement, then comparability of source data is automatically maintained and protected. Thus, the measured economic significance of the activities of individual accounting entities is the appropriate basis for facilitating understanding of the relationships and differences among various entities which is the essence of comparability.

9. The portfolio analysis approach assumes that, although the expected returns and risks of various securities are merely estimates and have no absolute truth in themselves, when they are compared with each other, they do command a relative truth of great economic significance in decision-making. This gives rise to the "relative" truth of accounting measurement and communication of information. Accordingly, there may be cases where the economic significance of some business events or operations can not be measured in terms of absolute truth, but should be measured relative to some common standard so that a relative truth can be obtained. That is, business analyses deal to a large extent with uncertainty; accordingly, truth may be measured only in relative terms.

10. The division of total risk into systematic and unsystematic risk possesses a measured economic significance in making investment/consumption decision, for knowledge of these portions of risk is very basic to both risk diversification and ranking of assets for

investment decisions. Data concerning many of the factors causing an asset risk may be classified as accounting information. Accordingly, the accounting function should investigate deeply this division of total risk with the hope of finding meaningful surrogates of measuring and reporting these factors.

11. The importance of the covariance concept in measuring an asset's risk holds regardless of whether the security is analyzed within a portfolio context or in relation to some market return index, e.g., Standard and Poor's average, Dow Jones average, and NYSE index. When properly calculated, an asset's systematic risk (imposed by market conditions) is a good estimate of the asset's risk calculated in a harder way within a portfolio context. Thus, the division of total risk into systematic and unsystematic portions eases to a large extent the estimation and ranking of a security's risk/return characteristics.

12. The division of total risk into systematic and unsystematic portions is important, for in addition to easing the estimation of an asset's expected return/risk characteristics, it is also required for the determination of the risk premium which is appropriate to compensate for a particular degree of additional risk. Specifically, knowledge of systematic risk is needed to estimate the appropriate risk premium that should be added to the riskless rate of return to obtain the required expected rate of return from a particular security.

13. The essense of fundamental security analysis is to estimate the intrinsic value of the security as a basis for investment decisions. The main problems facing fundamental security analysis are the determination of (1) the economic income or normalized EPS that represents the economic significance of the firm's operations, and (2) the earning multiplier or reciprocal of capitalization (discount) rate. Systematic risk and earnings growth are major factors affecting the estimate of an appropriate discount rate. Therefore, expected return/risk analysis and related input data are also essential to fundamental security analysis.

14. Security markets are weakly and semi-strong efficient. Accordingly, naive investors, i.e., technical analysts or chartists, dart throwers, and speculators, who have access only to public news, are the ones responsible for the aimless fluctuation of security prices. Fundamental security analysts should be given the credit for correcting these fluctuations and narrowing them down close to the securities' true economic value.

Accounting function should re-examine its responsibility as to lessening the heterogeneous expectations of investors and in turn the fluctuations of stock prices. If this can happen, a better performance of capital market would be achieved and, accordingly, economic resources would be more efficiently allocated and used in the direction of economic growth and social welfare.

15. Accounting measurement and communication of information should pertain to the evaluation of the entity being accounted for in terms of its effectiveness in achieving its operating objective. For a business enterprise, maximization of the value of the firm to its stockholders seems to be the most generally accepted operating objective that management should attain. Such an operating objective is generally considered neutral to all beneficiaries in the firm as well as it is economically feasible basis for decision-making under the conditions of uncertainty. Compared with the conventional objectives of maximizing total profits and maximizing EPS, maximization of the value of the firm to its stockholders is regarded as being more appropriate because in addition to the magnitude of profits it takes into consideration other factors such as risk factors, dividends decisions, growth, etc.

16. The capital maintenance concept, somehow, implies that the firm's net worth should be preserved, and accordingly, it confuses managerial policies and decisions with those of accounting. Management's decisions and professional accounting decisions should not be mixed up simply because of the so-called management's needs of accounting flexibility. Accountants and their instruments of measurement should not be expected or used to cover the unfavorable economic effects on the firm's activities which result from the decisions of others. Also, the conventional capital maintenance and transaction approaches of income determination contradict each other in application and are too narrow to provide for an explicit accounting consideration to several economic factors, other than total profits, such as risk, dividends, growth, managerial efficiency, etc. Accordingly, measurement of accounting income has been emphasizing the information needs of decision-making of traditional business finance which ignores risk and puts great emphasis on expected return analysis alone. On the other hand, contrary to the conventional concepts of accounting income, the firm's operating objective of maximizing its value to its stockholders provides an evaluation concept which is more inclusive and flexible enough to provide for an explicit accounting treatment of nearly all economic factors that should affect financial decision-making. Theoretically, basing

accounting measurement on the applications of this evaluation concept is more appropriate in providing buyers and sellers of the firm's securities as well as providing the management with adequate information to judge the current and future performance of the firm.

17. Gordon's dividends valuation model, or some version of it, is generally considered appropriate for valuating the firm in relation to its operating objective. All factors that effect the value of the firm can be incorporated into this model. The discount rate in Gordon's model is the cost of equity capital, K_e, or the minimum rate of return on the equity financed portion of the firm's investment projects, required by investors at the margin in order to leave unchanged the market price of its common stock. K_e should include a risk premium M, which may be defined as consisting of B, a premium for business risk, and F, a premium for financial risk. Thus K_e and, in particular, its portion of risk premium is the dynamic connecting link between decisions of the firm and decisions of investors. As such, it directly affects the value of the firm. The financial management must think as investors do when it estimates K_e for its firm. The estimate of future dividends (required to solve for K_e) as preceived by investors is a major problem. Nevertheless, these estimates must be made. Accordingly, appropriate accounting measurement and communication of the firm's dividends and related policies should narrow down and improve the investors view of future dividends. This in turn makes the investors perception of expected dividends more adequately predictable.

18. The capital structure of the firm does matter in that it can affect the firm's cost of capital K. Accordingly, it can affect the achievement of the firm's operating objective. Appropriate accounting for the firm's capital structure and related policies should in turn, ease the prediction and evaluation of the firm's expected return/risk characteristics.

19. The dividends policy of the firm is generally relevant in that it can affect the investor's view of the firm's expected return/risk characteristics. Thus, consistent with generalization #17, appropriate accounting for the firm's dividends decisions and related policies is needed.

20. The value of the firm is a function of the quality of its overall expected return/risk characteristics, which in turn is a function of the investor's perception and appreciation of the firm's decisions of investment, financing, and dividends. That is, $V_f = f[E(r_f),\sigma_f] = f\ (I,F,D)$. Therefore, the value of the firm depends also on the quality of communication between the firm

and the security market. Expected return, risk, and intrinsic value are the end summary parameters which are central to this communication because they are the main valuation parameters used by both management and investors. Therefore, the same accounting information pertaining to these major parameters are needed by both sides. Accordingly, the neutrality of this information is required to enhance the quality of communication and to improve valuation of the firm and the related decision-making in the capital market.

21. The explicit value of the firm's stock is the sum of the implicit values of its separate activities. Investors can not give an explicit value to these separate activities because they can't deal directly in them. However, while investors are explicitly evaluating the firm's expected return/risk characteristics for their decisions, they are implicitly evaluating the firm's decisions. Therefore, the important conclusion is that the management should evaluate the separate activities of the firm as if investors could trade directly in these activities.

22. The measurement of risk of an asset (a share of stock), an activity, or the firm as a whole therefore can be approximated by the systematic risk measured in relation to some market return index r_m, such as: Dow Jones Average, Standard and Poor's Average, and NYSE index. Much accounting information about a firm's risk can be added or improved by measuring it in relation to one of these indices to be agreed upon or of their weighted average. In the past, many data have not been classified as accounting information because of the profession's fear of not being able to determine their absolute truth or because they have no useful absolute truth of their own. However, many data can be classified as important accounting information because, when they are measured in relation to some common standard, they command relative truth of great significance in decision-making.

APPENDIX B

BASIC CONCEPTS OF THE INTEGRATED THEORY

Neutrality Concept: Neutrality of accounting measurement should be derived from the state of impartially relating the formulation and the application of accounting principles (propositions) to the most feasible economic description of the activities of the firm, as well as to those intended feasible uses of such description.

Practicality Concept: The practicality concept of accounting measurement requires that any formulation of a normative accounting theory should preserve some degree of practicality in application.

Concepts of expected return and risk: expected return and risk are inseparable and essential statistics in financial decision making under uncertainty, and accordingly, accounting measurement and communication of information should give them equal importance.

The concept of a measured economic significance: For making financial decisions, the analysis and comparison of expected returns and risks of various securities presumes that these statistical parameters represent the economic significance of the business activities of related firms. In other words, such comparison is, in essense, being made between the economic significances of the activities of various firms concerned. Thus, accounting measurement should focus attention on the economic significance of these activities.

The relative truth concept of accounting measurement: Business analysis deal to a large extent with human behavior and conditions of uncertainty; therefore, truth may be measured and communicated only in relative terms.

Systematic and unsystematic concepts of risk: The division of total risk into systematic and unsystematic portions eases diversification policies, determination of risk premium and ranking of various assets for investment analysis decisions. Calculation of the covariance of the firm's return with some market return index eases accounting measurement and communication of systematic risk.

Concept of prudent uses of accounting information: Accounting concepts and related principles and methods of measurement should be made consistent with the intended uses of prudent financial decision-makers.

The concept of the firm's valuation: The value of the firm reflects the quality of the investors' perception and appreciation of its financial policies and decisions. Accordingly, the accounting information pertaining to the valuation of the firm are needed by the current and prospective investors in the firm's securities as well as by the management of the firm. While the value of the stock depends on the quality of its expected return/risk characteristics, it also depends on the quality of information communication between the firm and the security market with respect to these characteristics.

The concept of the relevancy of capital structure and dividends policies: Both of the firm's financing mix and dividends policies are relevant decision variables that can affect the value of the firm, as well as investors' decision-making.

APPENDIX C

BASIC PROPOSITIONS OF THE INTEGRATED THEORY

1. Accounting is the measurement and communication of the firm's expected rate of return/expected risk parameters and the related supporting schedules required for the evaluation of the firm as a whole and as separate activities in relation to the operating objective of maximizing its value to its stockholders.

2. The primary basis of accounting for the firm's expected return and associated risk is the calculation and estimation of the expected revenues and costs as they are related to the firm's financial policies and decisions.

3. Balance sheet items are passive residuals in relation to the valuation of the firm and their measurement is relevant only to the extent that they affect the measured economic significance of the firm's expected revenues and costs as well as the variability of these revenues and costs.

4. Accounting is the neutral measurement and communication of all possible historical information bearing an economic significance to a prudent and a feasible evaluation of the firm (both as a whole and as separate activities) with respect to its operating objective of maximizing its value to its stockholders.

5. Past transactions, events and conditions whose extrapolation into the future will imply that they, or any of their kind in the future, are expected to affect the achievement of the operating objective of the firm and in turn its stockholders' wealth, when measured, should constitute a measured economic significance of interest to prudent financial analysts.

6. The primary basis of accounting is the measurement of the economic significance of the firm's efforts, or causes, and its accomplishments, or effects. In order to have this measurement command an economic significance for decision-making 1) causes and effects must be related to the achievement of the firm's operating objective; 2) causes and effects must be relatable to each other individually or in groups, directly or indirectly; and 3) the measurement of various causes and effects must be capable of timely extrapolation and usage.

7. Methods and procedures of data gathering and processing should be neutral so that the identification, measurement and the extrapolation of various economic attributes pertaining to the causation relationships of the firm's activities are not precluded. Only outside environmental reasons (i.e., lack of data) and/or the nature of the business activities (i.e., joint activities) may preclude cause/effect relationships and their extrapolations.

8. The firm's performance should be divided into separate activities (i.e., according to major products or market segments) where each activity consists of a number of definitely related causal pairs in the said series of sub-relationships. Such division should be made consistent with the objective of (1) easing the identification of various causations and related physical economic attributes, and (2) making the extrapolation of these causations possible and meaningful. Accordingly, such division, whether it is upward towards larger size activities or downward towards smaller size activities, should be made consistent with the purpose of obtaining a direct identification of the largest possible dollar magnitude of these relationships.

9. In order to recognize a business activity or a transaction as an asset (1) the activity must involve some effort, or cost, necessarily and legally incurred in order to acquire an intended asset, (2) the incurred efforts and costs are accumulated in relation to that intended asset, (3) such an asset is acquired or reasonably expected to be acquired through delivery, production or research, (4) the asset is expected to contribute to the accomplishment of the firm's operating objective and (5) that items 1, 2, 3, and 4 above are not reversed until the time of financial reporting.

10. In order to recognize an expense for net income determination (a) the related business activity must involve an effort or cost necessary and legally incurred to acquire revenues or income, (b) the incurred efforts or costs must be accumulated in terms of the function they serve in order to produce revenue, (c) the related revenues are received or reasonably expected to be received or collected in the near future without additional costs or with negligible amount of additional costs, and (d) items, a, b, and c above are not reversed until the time of the financial reporting.

11. In order to recognize revenues for income determination (a) it must be the result of an effort necessarily and legally incurred to acquire revenue, (b) revenues must be received or reasonably expected to be collected without additional cost or with negligible amount of additional cost, (c) revenues are accumulated according to their source (i.e., by products and market segments) which reflect the related firm's producing-revenue efforts, and (d) items a, b, and c above are not reversed at the time of financial reporting.

12. The accounting profession should agree on an error level allowable, not in terms of a total dollar amount, but rather as a maximum percentage of net incomes or EPS of all firms. That is, the total amount of various applications of the allowed error in accounting for any firm should be within $\pm$ % of its net income and EPS.

13. In order to have accounting for the firm's capital structure command a measured economic significance for decision-making in relation to the firm's financial risk cause/effect extrapolatory accounting would require that the firm's financing transactions be properly reported according to their sources. Also the income statement should clearly indicate the portions of income pertaining to each source of financing, namely, equity, preferred stock, debt, etc.

14. A) statement should be formulated of the firm's capital structure indicating how management has formulated its policy of capital structure in the past and whether the financing mix is going to be changed and in which direction the debt/equity ratio will be moving. Also, this statement may indicate whether the changes are to apply to finance working capital, acquisition of fixed assets or just the replacement of another source of financing. However, if these changes involve disinvestment decisions, this, also, should be indicated; b) a statement should be formulated of the firm's dividends policy, indicating how the management has formulated the firm's dividends policy in the past and whether the dividend payout ratio will continue the same or be increased or decreased. Also, this statement may indicate how dividends decisions are to be made in relation to the firm's financing decisions in the future.

15. The accounting profession should try to find some attributes to measure and communicate the effects of the separate components of systematic and unsystematic risk on the operating objective of the firm. However, price level accounting as is discussed in the contemporary literature, if properly practiced, will provide an adequate basis for measuring and communicating the inflation risk component of the systematic risk. Moreover, in pursuing

the measurement of the total systematic risk and the total unsystematic risk this dissertation proposes that a statement should be made indicating the firm's historical rate of return/risk characteristics, where these characteristics are to be measured in relation to some market return index to be agreed upon by the accounting profession.

16. A cause/effect extrapolatory accounting will also consider a statement of the firm's most representative historical cost and revenue functions, along with supporting schedules indicating the historical values of the independent variables, as constituting a measured economic significance in decision making. The supporting schedules may indicate the historical variable and fixed costs and the methods used in allocating common and joint costs, etc.

VITA

Abdulfattah Omar Dia Elmadfai was born December 24, 1942 in Awalad Easa, Kikla, Libya, to Amena E. Elgadi and Omar D. Elmadfai. He attended public schools in Kikla, Garian, Zavia and Benghazi, Libya. In 1961 he graduated from Zavia Secondary School. In June 1965 he finished his undergraduate study at the University of Libya and received a bachelor of science in accounting and business administration. In 1965-1966 he worked as a cost analyst for Esso Standard Oil Corporation of Libya. In 1966-1967 he worked as a teaching assistant at the University of Libya in Benghazi. In January 1970 he received his Master of Science in Accounting from the University of Wisconsin, Madison City. During 1970 he lectured at the School of Business, University of Libya. Finally, in December 1972 he started his doctoral program at Louisiana State University in Baton Rouge.

EXAMINATION AND THESIS REPORT

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Title of Thesis: An Integrated Theory of Accounting Using Capital/Expense Decision in the Petroleum Industry as a Special Application

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

July 19, 1976